

Muzeul Județean Mureș

MARISIA



Studii și materiale

XXIX–XXX

Științele Naturii

2010

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XXIX–XXX

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MUZEUL JUDEȚEAN MUREȘ

MARISIA

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XXIX–XXX

ȘTIINȚELE NATURII

Târgu-Mureș
2010

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BOTANY

MESOPHILIC GRASSLANDS OF *MOLINIO-ARRHENATHERETEA* CLASS OF SIGHIȘOARA-TÂRNAVA MARE SITE

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Abstract: The objectives of this study were to identify the major habitat types in Târnava Mare-Sighișoara-ROSCI0227 site, the semi-natural grassland types and associations that form them, and identifying the vascular plants in the critical list. Researched grasslands belong to the following counties: Mureș, Sibiu, Brașov, Harghita. These grasslands are classified as *Molinio-Arrhenatheretea*, according to the system advocated by the authors: Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993). Observations and field researches in the Târnavelor Plateau were conducted in 26 localities: Angofa, Apold, Archita, Beia, Brădeni, Cloașterf, Criș, Daia, Fișer, Grânari, Iacobeni, Laslea, Mihai Viteazu, Netuș, Noiștat, Nou Săsesc, Retiș, Roandola, Ruja, Saschiz Stejărenii, Stejărișu, Șaeș, Șarpatoc, Țeline and Vulcan (included in Natura 2000 Sighișoara-Târnava Mare), were conducted during 2003–2010, during the vegetation period. In the studied area 14 plant associations were identified, 97 surveys being performed. Taxa in various stages of imperilment have been identified in the flora of these grasslands, as well as European taxa threatened or included in national red lists: *Carex hordeistichos*, *Dactylorhiza incarnata ssp. incarnata*, *Gymnadenia conopsea*, *Orchis coriophora*, *Orchis tridentata*, *Euphorbia virgata*, *Inula bifrons*, *Ranunculus lingua* etc.

Keywords: flora, Red List, vegetation, Târnava Mare River, Transylvania, Romania, semi-natural vegetation, habitats.

Introduction

Conservation of biodiversity is a complex process that takes place in a well-defined international and national legal framework. Natura 2000 aims to collect data on certain species of plants and habitats, mapping data on species and habitats (i.e. identifying, locating and ensuring their inclusion in protected areas). The objectives of this study are to identify major habitat types, semi-natural grassland types and the associations that form them, and to identify the vascular plants in the critical list.

Materials and methods

The studied territory included the following localities: Angofa, Apold, Archita, Beia, Bradeni, Cloașterf, Criș, Daia, Fișer, Grânari, Iacobeni, Laslea, Mihai Viteazu, Netuș,

Noiștat, Nou Săsesc, Retiș, Roandola, Ruja, Saschiz Stejărenii, Stejărișu, Șaeș, Șarpatoc, Țeline and Vulcan.

Observations and field researches were conducted from 2003 to 2010, during the plants vegetation period. The types of grasslands were identified, and within these, several phytosociological surveys were carried out, following the Braun-Blanquet method [5, 6]. Sample areas were selected so as to include altitudinal variations that exist within the territory. Determination of species was done on the field and in laboratory, based on the collected material, especially for difficult to identify taxa, using Flora Romania [23]. Nomenclature of species is consistent with Flora Europaea [24, 25]. Syntaxonomic classification was based on consulting the most recent classification papers at European level [4,14,16,17] and also on synthetic works developed on the vegetation of Romania [1, 2, 7, 8, 9, 12, 15, 19, 20, 21, 22].

Results and discussion

Habitats described distinguish themselves by a wealth of flora, important for preserving plant and animal diversity, some of which are recognized as key habitats for maintaining biodiversity in Europe. Some habitat types are coded according to Interpretation Manual of Natura 2000 Romanian habitats developed and printed in Romania under the PHARE project “Implementation of NATURA 2000 in Romania” [13] and the rest according to Habitats in Romania [10, 11]. Special attention was given to rare, vulnerable and endangered species in the National Red Lists [4, 18].

Molinio-Arrhenatheretea class includes mesohygrophilic and mesophilic phytocoenoses that grow in soils with variable moisture content and rich in nutrients. Some of the characteristic species of this class are: *Festuca pratensis*, *Alopecurus pratensis*, *Prunella vulgaris*, *Ranunculus acris*, *Rumex acetosa*, *Stellaria graminea* etc. They are used as a hayfield or pastures. Several plant associations of this class were identified, named according to applicable syntaxonomic indications.

MOLINIO-ARRHENATHERETEA R.Tx.1937 em.R.Tx.1970

MOLINIETALIA KOCH 1926

Calthion R.Tx. 1937 em. Bal.-Tul. 1978

Calthenion (R.Tx.1937) Bal.-Tul. 1978

Angelico-Cirsietum oleracei Tüxen 1937

Scirpetum sylvatici Ralski 1931

Ranunculeto strigulosi-Equisetetum palustris Gh. Popescu (1974)1975

Junco inflexi-Menthetum longifoliae Lohm. 1953

Epilobio palustri-Juncetum effusi Oberdorfer 1953, 1957

Holco-Juncion Pass. 1964

Holcetum lanati Issler 1936

Agrostion stoloniferae Soó (1943) 1971

Agrostetum stoloniferae (Ujvárosi 1941) Burduja et al. 1956, 1958

Filipendulenion (Lohmeyer in Oberd.et al.1967) Bal.-Tul. 1978

Filipendulo-Geranietum palustris Koch 1926

Deschampsion caespitosae Horvatić 1930

Agrostio-Deschampsietum caespitosae (Soo,1928) Ujvarosi 1947

Cirsio cani-Festucetum pratensis Májovski ex Ruzickova 1975

ARRHENATHERETALIA R.TX.1931

Arrhenatherion Koch 1926

Arrhenatheretum elatioris Br.-Bl.ex Scherrer 1925

Trisetetum flavescens (Schröter) Brockmann, J. 1907, Beger 1922

Cynosurion R.Tx.1947

Anthoxantho-Agrostetum tenuis (Silinger 1933) Jurko 1969

Festuco rubrae-Agrostietum capillaris Horv.1951

1. PHYTOCOENOSSES CHARACTERISTIC TO WET AND FLOODED MEADOWS

These hayfields are classified in *Molinietalia* and are present especially in wet meadows. The correspondence between habitat type in the classification system used at European level and Romanian level is:

NATURA 2000: 6430 Hydrophilous tall herb fringe communities along plains and woodland edges and in the area of the subalpine tree line

CLAS. PAL.: 37.7 and 37.8

HDR: 3708, R3714

The following plant associations are divided in this type of habitat:

Angelico-Cirsietum oleracei Tüxen 1937

Phytocoenoses are present in the form of broad strips in the Hârtibaci Valley, at an altitude of 478 m, between the localities of Iacobeni and Stejărișu (N 46°02', E 24°43'; identified on 2007.07.27), on alluvial pseudogleyic soils, rich in nutrients. Coenoses are tiered, with 96.5% coverage; the upper level is made of high weeds such as: *Cirsium oleraceum* (AD⁵), *Angelica sylvestris* (edifying species), *Cirsium rivulare*. Species of Calthion alliance are also present: *Mentha longifolia*, *Geranium palustre*, adding also the species of Molinietalia order: *Equisetum palustre*, *Trifolium hybridum*, *Symphytum officinale*, *Galium uliginosum*, as well as species characteristic to Molinio-Arrhenatheretea class: *Holcus lanatus*, *Trifolium repens*. Species of Galio-Urticetea also penetrate the coenoses: *Erigeron annuus*, *Myosoton aquaticum*. The hygrophilic character is underlined by the characteristic species of Phragmito-Magnocaricetea class: *Cirsium canum*, *Phragmites australis* etc. Phytocoenoses were also infiltrated by species characteristic to Artemisietea class: *Artemisia vulgaris*, *Arctium tomentosum*.

The conservation value is low. Unlike previous years, areas occupied by these coenoses have greatly diminished due to conversion of such lands into arable land.

Filipendulo-Geranium palustre Koch 1926

This association is met in the hill level and prefers basic soils. Coenoses were identified in Beia, Harghita County (N46 ° 07', E25 ° 09' on 2007.07.18). Coenoses were studied at an altitude of 646 m, with vegetation coverage of 90.5%. *Filipendula ulmaria* (AD⁴) is predominant in coenoses formation, and *Geranium palustre* (AD¹) has a subordinate role. The floristic diversity of the association is low. Besides the edifying species of Filipendulenion, other species have been identified: *Lysimachia vulgaris*, *Mentha longifolia*, of Calthion: *Epilobium palustre*, *Myosotis scorpioides*, *Scirpus sylvaticus*, and those in Molinietalia: *Agrostis stolonifera*, *Cirsium canum*, *Cirsium rivulare*, *Deschampsia caespitosa*, *Epilobium parviflorum*, *Equisetum palustre*, *Galium palustre*, *Galium uliginosum*, *Juncus effusus* (AD¹), *Lythrum salicaria*, and *Sanguisorba officinalis* (AD¹), and Molinio-Arrhenatheretea: *Campanula patula* ssp. *patula*, *Carex pallescens*, *Dactylis glomerata*, *Lysimachia nummularia*, *Prunella vulgaris*, *Ranunculus repens*, *Symphytum officinale* etc.

***Scirpetum sylvatici* Ralski 1931**

Scirpetum sylvatici association appears as clusters of reduced extensions along the streams, on clay and acid soils. Coenoses are often flooded, regularly, soil being well soaked with water so that it remains wet throughout the year. Due to the dominance of *Scirpus sylvaticus* populations (Table 1), floristic diversity remains reduced, so that their phytosociological characterization is often difficult. Besides the edifying species, species of Molinio-Arrhenatheretea class are also found: *Juncus inflexus*, *Equisetum palustre*, *Lychnis flos-cuculi*, *Lythrum salicaria* etc. Association is frequently met in the studied area, at altitudes between 430–580 m.

The phytocoenoses of this association, while showing no economic importance, they fructify make the most of a swampy ecotope unsuitable for other useful vegetation formations, having a role in maintaining the ecological balance.

Table 1: *Scirpetum sylvatici* Ralski 1931

Relevé	1	2	3	4	5	
Altitude (ms.m)	584	584	431	557	497	
Area (m ²)	100	100	100	100	100	
Vegetation coverage (%)	97,5	86	82,5	100	100	K
Car. ass.						
<i>Scirpus sylvaticus</i>	5	4	4	5	5	V
Calthenion						
<i>Cirsium rivulare</i>	1	+	1	–	+	IV
Calthion						
<i>Epilobium palustre</i>	+	–	+	–	+	III
<i>Equisetum palustre</i>	+	2	+	+	–	IV
<i>Galium uliginosum</i>	+	+	+	–	+	IV
<i>Juncus articulatus</i>	–	–	+	–	–	I
<i>Lysimachia nummularia</i>	–	+	+	–	+	III
Filipendulion ulmariae						
<i>Filipendula ulmaria</i>	–	–	–	1	–	I
<i>Epilobium hirsutum</i>	–	–	–	+	+	II
<i>Geranium palustre</i>	–	–	–	+	+	II
Molinietalia, Molinio–Arrhenatheretea						
<i>Agrostis stolonifera</i>	–	–	+	+	+	III
<i>Alopecurus pratensis</i>	–	–	–	+	+	II
<i>Convolvulus arvensis</i>	–	+	+	–	–	II
<i>Deschampsia caespitosa</i>	–	–	+	+	–	II
<i>Juncus inflexus</i>	+	+	+	+	–	IV
<i>Lychnis flos–cuculi</i>	+	–	+	–	–	II
<i>Lythrum salicaria</i>	–	+	+	+	+	IV
<i>Mentha longifolia</i>	+	–	+	–	–	II
<i>Prunella vulgaris</i>	+	+	+	–	–	III
<i>Ranunculus repens</i>	+	+	+	+	1	V
<i>Rumex crispus</i>	+	–	+	–	–	II
<i>Trifolium repens</i>	–	+	+	–	–	II
Phragmitetea						
<i>Eleocharis palustris</i>	–	+	+	–	–	II

Species present in one relevé: *Rorippa pyrenaica* (1), *Potentilla erecta* (2), *Veronica beccabunga* (2), *Trifolium hybridum* (3), *Carex distans* (3), *Cerastium holosteoides* (3), *Juncus effusus* (3), *Potentilla reptans* (3), *Rhinanthus rumelicus* (3), *Symphytum officinale* (3), *Carex vulpina* (3), *Galium palustre* (3), *Lysimachia vulgaris* (3), *Ranunculus lingua* (3), *Sparganium erectum* ssp. *neglectum* (3), *Typha latifolia* (3), *Centaureum pulchellum* (4), *Cirsium oleraceum* (4), *Lycopus europaeus* (4), *Mentha verticillata* (4), *Allisma plantago-aquatica* (4), *Glyceria maxima* (4), *Cyperus flavescent* (4), *Holcus lanatus* (5), *Juncus effusus* var. *compactus* (5), *Mentha aquatica* (5), *Phleum pratensis* (5), *Galeopsis tetrahit* (5).

Location and date of relevés: **R1–2** – Cloașterf; 2005.07.29; **R3**–Șaeș, La Lac, N 46° 09', E 24° 46', 2006.07.22; **R4** – Noiștat; N 46° 02', E 24° 486', 2007.07.27; **R5** – Brădeni; N 46° 05', E 24° 47', 2007.07.28;

***Ranunculeto strigulosi-Equisetum palustris* Gh. Popescu (1974) 1975**

This association is least known in Romania, being cited in the Târnavelor Plateau by Șt. Csűrös, A. Kovacs (1962), in Oltenia by Gh. Popescu (1974) and in north-west of Romania by Petru Burescu (2003). The association was identified in Șaeș, on the shores of the lake “La Lac”, a land with excessive humidity, especially in spring. The phytocoenoses of this association are interposed between sedges and wet meadows. The two characteristic species *Equisetum palustre* and *Ranunculus acris* ssp. *strigosus* have a similar ecology, edifying the phytocoenoses of this association. Species for the recognition of Calthion alliance are: *Galium uliginosum*, *Angelica sylvestris*, *Holcus lanatus* etc., and the most representative species of the Molinietales order are: *Potentilla anserina*, *Lythrum salicaria*, *Mentha longifolia*, *Valeriana officinalis*, *Juncus effusus* etc. Transgressive species, immigrated from subordinated associations of Phragmitetea class, play an important coenotic role in the structure of phytocoenoses: *Eleocharis palustris*, *Carex vulpina*.

HdR: 3709 – Danube communities with *Juncus effusus*, *Juncus inflexus* and *Agrostis canina*
They are generally used as pasture phytocoenoses.

***Epilobio-Juncetum effusi* Oberd. 1957**

Rush phytocoenoses have been identified in the hilly level of Ruja, between Țeline and Rețiș, and in Rețiș, Ruja, Șaeș, Șarpatoc, Vulcan, on the flats, at altitudes between 430–600 m in the floodplains of streams. Exposed to zoo-anthropogenic impacts, the association is developing under the action of grazing cattle, which favors the dominance of *Juncus effusus* synusia. Phytocoenoses have 83 species in their floristic composition (in six surveys analyzed, Table 2) and have a 70–98% coverage. The most numerous species belong to the Molinietales order: *Lysimachia vulgaris*, *Mentha longifolia*, *Epilobium palustre*, *Juncus articulatus*, *Myosotis scorpioides*, *Trifolium hybridum*, *Agrostis stolonifera*, *Alopecurus pratensis*, *Cirsium rivulare*, *Deschampsia caespitosa*, *Epilobium parviflorum*, *Equisetum palustre*, *Galium uliginosum*, *Inula britannica*, *Juncus atratus*, *Juncus conglomeratus*, *Mentha aquatica*, *Mentha x verticillata*, *Potentilla anserina*, *Potentilla reptans*, but also of the *Molinio-Arrhenatheretea* class: *Achillea millefolium*, *Agrostis capillaris*, *Centaureum erythraea*, *Holcus lanatus*, *Lysimachia nummularia*, *Ranunculus acris*, *Ranunculus repens*, *Stellaria graminea*. In the analyzed phytocoenoses are also present characteristic species of Phragmitetea class: *Carex vulpina*, *Lycopus europaeus*, *Lythrum salicaria*.

Table 2: *Epilobio-Juncetum effusi* Oberd. 1957

Relevé	1	2	3	4	5	6	
Altitude (m s.m.)	604	434	641	489	509	515	
Area (m ²)	100	100	100	100	100	100	
Vegetation coverage (%)	78,5	98	70	70,5	76,5	80,5	K
Car. ass.							
<i>Juncus effusus</i>	3	5	3	4	4	4	V
<i>Juncus effusus</i> var. <i>compactus</i>	1	—	2	+	—	+	IV
Filipendulenion							
<i>Lysimachia vulgaris</i>	+	+	+	—	—	—	III
<i>Mentha longifolia</i>	+	+	+	—	—	—	III
Calthion							
<i>Epilobium palustre</i>	+	—	+	+	—	+	IV
<i>Juncus articulatus</i>	+	—	+	—	—	—	II
<i>Myosotis scorpioides</i>	+	—	+	—	—	—	II
<i>Trifolium hybridum</i>	+	+	+	—	+	+	V
Molinietales							
<i>Agrostis stolonifera</i>	+	+	+	+	+	+	V
<i>Alopecurus pratensis</i>	—	—	—	—	+	+	II
<i>Cirsium rivulare</i>	—	+	—	+	+	—	III
<i>Deschampsia caespitosa</i>	2	+	+	—	+	1	V
<i>Epilobium parviflorum</i>	—	—	—	—	+	+	II
<i>Equisetum palustre</i>	—	+	—	—	+	—	II
<i>Galium uliginosum</i>	+	+	—	—	+	+	IV
<i>Inula britannica</i>	+	—	—	—	—	+	II
<i>Juncus atratus</i>	+	—	+	—	—	—	II
<i>Juncus conglomeratus</i>	+	—	+	—	—	+	III
<i>Mentha aquatica</i>	+	—	+	—	—	+	III
<i>Mentha x verticillata</i>	—	+	+	—	+	—	III
<i>Potentilla anserina</i>	—	—	—	+	—	+	II
<i>Potentilla reptans</i>	+	—	+	—	—	+	III
Molinio-Arrhenatheretea							
<i>Achillea millefolium</i>	+	—	—	—	+	—	II
<i>Agrostis capillaris</i>	+	—	+	—	—	—	II
<i>Centaureum erythraea</i>	+	—	+	—	—	—	II
<i>Holcus lanatus</i>	+	—	+	—	+	+	IV
<i>Lysimachia nummularia</i>	+	—	+	—	+	+	IV
<i>Ranunculus acris</i>	+	—	+	—	+	—	III
<i>Ranunculus repens</i>	+	—	+	+	+	+	V
<i>Stellaria graminea</i>	+	—	+	+	—	—	III
Phragmiti-Magnocaricetea							
<i>Carex vulpina</i>	+	+	+	—	+	—	IV
<i>Epilobium parviflorum</i>	+	—	+	—	+	—	III
<i>Lycopus europaeus</i>	—	—	+	+	+	—	III
<i>Lythrum salicaria</i>	+	+	+	+	+	+	V

Variae Syntaxa							
<i>Clinopodium vulgare</i>	+	–	+	–	–	–	II
<i>Gypsophylla muralis</i>	+	–	+	–	–	–	II
<i>Hypericum perforatum</i>	–	–	–	+	–	+	II
<i>Juncus tenuis</i>	+	–	+	–	–	–	II
<i>Lotus tenuis</i>	–	–	–	–	+	+	II
<i>Polygonum mite</i>	–	–	+	–	–	+	II
<i>Rorippa sylvestris</i>	–	+	–	+	–	–	II

Species present in one relevé: *Bromus commutatus* (1), *Carex distans* (1), *Cerastium holosteoides* (1), *Cichorium intybus* (1), *Cynosurus cristatus* (1), *Dianthus armeria* (1), *Galium mollugo* (1), *Lolium perenne* (1), *Poa palustris* (1), *Stachys germanica* (1), *Angelica sylvestris* (2), *Carex lepidocarpa* (2), *Eleocharis palustris* (2), *Eupatorium cannabinum* (2), *Rhinanthus rumelicus* (2), *Scirpus sylvaticus* (2), *Stachys officinalis* (2), *Symphytum officinale* (2), *Veronica scutellata* (2), *Carex hirta* (3), *Carex ovalis* (3), *Calamagrostis epigeios* (4), *Galega officinalis* (4), *Rumex crispus* (4), *Stellaria aquatica* (4), *Vicia cracca* (4), *Anagalis arvensis* (5), *Anagalis foemina* (5), *Centaureum pulchellum* (5), *Cirsium canum* (5), *Euphorbia palustris* (5), *Fagopyrum convolvulus* (5), *Setaria viridis* (5), *Silene vulgaris* (5), *Thalictrum lucidum* (5), *Chenopodium album* ssp. *viride* (6), *Cruciata laevipes* (6), *Daucus carota* (6), *Inula helenium* (6), *Plantago lanceolata* (6), *Plantago major* (6), *Trifolium repens* (6).

Location and date of relevés: **R1** – Vulcan, N 46° 09', E 24° 51', 2006.07.19; **R2** – Saeș, lake, N 46° 09', E 24° 46', 2006.07.22; **R3** – Șarpatoc, N 46° 09', E 24° 50', 2006.07.25; **R4** – Ruja; N 46° 08', E 24° 38', 2007.07.23; **R5** – between Țeline și Retiș; N 46° 02', E 24° 53', 2007.07.30; **R6** – Retiș; N 46° 02', E 24° 52', 2007.08.06.

Junco inflexi-Menthetum longifoliae Lohm. 1953

Such phytocoenoses are present in moist meadows of streams, on moist soil. They develop in groups, in dense clusters over an area exceeding 25 m². These coenoses were identified in Grânari, at an altitude of 565 m. The floristic composition reveals the presence of 21 cormophytes species that have 77.5% coverage. The edifying species are *Juncus inflexus* (AD⁴) and *Mentha longifolia* (AD¹). The inventory of flora species shows the presence of species of Filipendulenion: *Lysimachia vulgaris*, *Epilobium hirsutum*, of Calthion: *Myosotis scorpioides*, *Scirpus sylvaticus*, *Trifolium hybridum*, and those in Molinietales: *Cirsium rivulare*, *Deschampsia caespitosa*, *Galium uliginosum*, *Potentilla reptans*, *Stachys officinalis* and *Valeriana officinalis*. Of Molinio-Arrhenatheretea class are present: *Dactylis glomerata*, *Lysimachia nummularia*, *Ranunculus repens* and *Ononis arvensis*. To the characteristic species of this order and class, add plants of Phragmitetea class: *Epilobium parviflorum*, *Lythrum salicaria*.

Holcetum lanati Issler 1936

The association has been identified in the Hârțibaci Valley, at an altitude of 515–520 m. Two plant relevés were made in: Netuș and Retiș. It is a secondary association, usually present in wet meadows. Phytocoenoses have a heterogeneous floristic composition consisting of 66 cormophytic species, species of the Molinio-Arrhenatheretea class in majority (59.09%). The constituents of phytocoenoses have 81.5% – 90% coverage. Thus, beside the characteristic species (*Holcus lanatus*, AD³⁻⁴), the following species of Molinietales are present: *Agrostis stolonifera*, *Centaureum pulchellum*, *Deschampsia caespitosa*, *Galium uliginosum*, *Inula britannica* and *Trifolium hybridum*.

There is a significant contingent of characteristic species of the class: *Achillea millefolium*, *Alopecurus pratensis*, *Anthoxanthum odoratum*, *Briza media*, *Centaureum Erythraea*, *Cerastium holosteoides*, *Cichorium intybus*, *Dactylis glomerata*, *Daucus carota*, *Festuca rubra*, *Lotus corniculatus*, *Luzula campestris*, *Medicago lupulina*, *Ononis arvensis*, *Plantago lanceolata*, *Prunella vulgaris*, *Ranunculus acris* (AD²) *Rhinanthus angustifolius*, *Rumex acetosa*, *Stachys officinalis*, *Stellaria graminea*, *Trifolium pratense*, *Trifolium repens*.

There are also present characteristic species of the order Arrhenatheretalia: *Agrostis capillaris* (AD²), *Ajuga reptans*, *Arrhenatherum elatius*, *Carum carvi*, *Centaurea nigrescens*, *Crepis biennis*, *Cynosurus cristatus*, *Hieracium pilosella* and *Rhinanthus rumelicus*. Species of Phragmitetalia order have infiltrated in the coenoses: *Epilobium roseum*, *Lycopus europaeus*, *Lythrum salicaria*.

There are also present species of Festuco-Brometea class: *Agrimonia eupatoria*, *Coronilla varia*, *Dianthus carthusianorum*, *Erigeron acris*, *Galium verum*, *Hypericum perforatum*, *Pimpinella saxifraga*, *Plantago media*, *Scabiosa ochroleuca*, *Thymus pulegioides*.

The grasslands are used as hayfields with great phytomass production but of poor quality. Phytocoenoses are rich in fodder, medicinal and honey plants.

NATURA 2000: 6440 Alluvial meadows of river valleys of *Cnidion dubii*

CLAS. PAL.: 37.23

HdR: R3712, R3715, R3716

***Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956, 1958**

Creeping bentgrass is present in the wet land areas of hilly regions where ground water is found near the surface of soils with clay-loam textures

In the investigated area, the association takes considerable expansion, coenoses being analyzed in Criș, Saschiz, Daia, between Nou Săsesc and Rondola, and in 2007, identified in Fișer. Despite the likelihood of physiognomic uniformity, the surveys revealed a remarkable diversity of flora (202 cormophytic species, Table 3). In addition to recognizable species of Molinion alliance and of Arrhenatheretalia order, there were also many species characteristic of Molinio-Arrhenatheretea class: *Achillea millefolium*, *Anthoxanthum odoratum*, *Briza media*, *Centaurea jacea*, *Cerastium holosteoides*, *Festuca rubra*, *Holcus lanatus*, *Leucanthemum vulgare*, *Lychnis flos-cuculi*, *Prunella vulgaris*, *Ranunculus acris*, *Rhinanthus rumelicus*, *Stellaria graminea*, *Trifolium pratense*, *Trifolium repens* etc.

These meadows are good fodder, being used as pastures for cattle.

Table 3: *Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956, 1958

Relevé	1	2	3	4	5	6	7	8	9	10	11	12	
Altitude (m s.m.)	482	482	482	558	413	569	611	504	620	569	513	577	
Area (m ²)	100	100	100	100	100	100	100	100	100	100	100	100	
Vegetation coverage (%)	100	100	99,5	100	88,5	99,5	78,5	89,5	76,5	99	85,5	85	K
Car.ass.													
<i>Agrostis stolonifera</i>	5	4	4	3	4	2	4	4	4	2	4	4	V
Molinion et Monilietalia													
<i>Alopecurus pratensis</i>	–	–	+	–	–	–	–	–	–	–	+	–	I
<i>Carex distans</i>	–	–	–	–	–	–	+	–	–	–	+	–	I
<i>Centaurea nigrescens</i>	–	–	–	–	–	–	–	–	–	+	+	+	II
<i>Cirsium canum</i>	–	–	–	–	–	–	–	+	–	–	–	+	I
<i>Genista tinctoria</i>	+	–	–	+	–	–	–	–	–	–	–	–	I
<i>Knautia arvensis</i>	–	–	–	+	–	+	+	–	+	+	–	+	III
<i>Lysimachia nummularia</i>	–	–	–	+	–	–	+	–	–	–	–	–	I
<i>Lythrum salicaria</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Melilotus officinalis</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Mentha arvensis</i>	–	–	–	–	–	+	–	+	–	+	–	–	II
<i>Mentha longifolia</i>	–	–	–	+	+	–	–	–	–	–	+	–	II

<i>Mentha verticillata</i>	-	-	-	-	+	-	-	-	-	-	+	-	I
<i>Myosotis scorpioides</i>	-	-	-	+	+	-	+	+	-	-	-	-	II
<i>Orchis coriophora</i>	-	-	+	-	-	-	-	-	-	-	+	-	I
<i>Trifolium hybridum</i>	-	-	-	+	-	+	+	-	-	+	-	+	III
<i>Trifolium montanum</i>	-	-	-	+	-	+	-	-	-	+	-	-	II
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	-	+	-	-	-	+	-	-	-	+	-	+	II
Molinio-Arrhenatheretea													
<i>Achillea millefolium</i>	+	+	+	-	+	+	+	+	+	+	+	-	V
<i>Anthoxanthum odoratum</i>	-	-	-	+	-	-	+	-	+	-	+	-	II
<i>Briza media</i>	-	+	+	+	-	-	-	+	+	-	+	+	III
<i>Centaurea jacea</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Centaureum erythraea</i>	-	-	-	+	+	-	-	-	-	-	+	+	II
<i>Cerastium holosteoides</i>	-	-	-	+	+	+	+	+	+	+	-	-	III
<i>Cichorium intybus</i>	+	+	+	+	+	1	+	+	+	1	-	-	V
<i>Dactylis glomerata</i>	+	+	+	+	+	+	-	1	+	+	-	-	IV
<i>Danthonia decumbens</i>	-	-	-	-	-	+	+	+	+	+	+	-	III
<i>Daucus carota</i>	-	-	-	+	+	+	-	+	+	+	+	1	IV
<i>Deschampsia caespitosa</i>	-	-	-	+	-	2	-	-	-	2	-	-	II
<i>Eryngium planum</i>	-	+	+	-	+	+	-	-	-	+	-	-	III
<i>Festuca pratensis</i>	-	-	-	-	-	-	-	-	-	-	-	2	I
<i>Festuca rubra</i>	-	-	-	2	-	-	+	-	-	-	+	+	II
<i>Holcus lanatus</i>	-	-	-	+	+	-	-	+	-	-	+	-	II
<i>Leucanthemum vulgare</i>	-	+	+	+	+	-	+	+	+	-	+	-	IV
<i>Lotus corniculatus</i>	-	-	-	+	+	+	-	+	+	+	+	+	IV
<i>Medicago lupulina</i>	-	-	-	-	-	+	-	+	-	+	-	-	II
<i>Ononis arvensis</i>	+	-	-	+	-	+	-	-	-	+	+	-	III
<i>Potentilla reptans</i>	-	-	-	+	-	+	-	-	-	+	-	-	II
<i>Prunella vulgaris</i>	-	-	-	+	+	+	+	-	-	+	+	-	III
<i>Ranunculus acris</i>	-	-	-	+	-	-	-	-	-	-	+	-	I
<i>Stachys officinalis</i>	-	-	+	1	-	+	+	-	-	+	+	+	III
<i>Stellaria graminea</i>	-	-	-	+	-	-	+	+	+	-	+	-	III
<i>Trifolium pratense</i>	-	-	-	-	-	+	-	+	+	+	+	-	III
<i>Trifolium repens</i>	-	-	-	+	+	+	-	+	+	+	+	+	IV
<i>Vicia sepium</i>	-	-	-	+	+	+	-	-	-	+	+	-	III
Arrhenatheretalia													
<i>Agrostis capillaris</i>	-	-	-	+	-	-	-	-	-	-	+	-	I
<i>Ajuga reptans</i>	-	-	-	+	+	-	-	-	-	-	-	-	I
<i>Arrhenatherum elatius</i>	-	-	-	-	-	-	+	-	+	-	-	-	I
<i>Campanula patula</i> ssp. <i>patula</i>	-	-	-	+	-	+	+	-	+	+	-	+	III
<i>Carum carvi</i>	-	-	-	+	+	+	-	-	-	+	-	-	II
<i>Centaurea nigrescens</i>	-	-	-	+	-	+	-	-	-	-	-	+	II
<i>Crepis biennis</i>	-	-	-	-	+	-	-	+	+	-	-	-	II
<i>Cynosurus cristatus</i>	-	-	-	+	+	-	-	-	-	-	+	+	II
<i>Rhinanthus rumelicus</i>	+	+	+	-	+	-	-	+	+	-	+	+	IV
<i>Viola tricolor</i>	-	-	-	-	+	-	-	-	-	-	-	+	I
Festuco-Brometea													
<i>Agrimonia eupatoria</i>	-	+	-	+	+	+	-	-	-	+	+	+	III
<i>Anthyllis vulneraria</i>	-	+	+	-	-	-	-	-	-	-	-	-	I

<i>Artemisia campestris</i>	-	-	-	-	-	+	-	-	-	+	+	-	II
<i>Asperula cynanchica</i>	-	-	-	+	+	+	-	+	+	+	+	+	IV
<i>Astragalus onobrychis</i>	-	+	2	-	-	-	-	-	-	-	-	-	I
<i>Brachypodium pinnatum</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Bupleurum falcatum</i>	-	-	+	+	-	+	-	-	-	+	-	-	II
<i>Campanula sibirica</i>	-	-	-	+	+	-	-	-	-	-	-	-	I
<i>Carlina biebersteinii</i> ssp. <i>brevibracteata</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Centaurea scabiosa</i>	-	-	-	-	-	+	-	-	-	+	+	-	II
<i>Cerinth minor</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Chamaecytisus albus</i>	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Clinopodium vulgare</i>	-	-	-	+	+	+	+	-	-	+	+	-	III
<i>Coronilla varia</i>	+	+	+	+	-	+	-	+	+	+	-	-	IV
<i>Dianthus carthusianorum</i>	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	+	2	+	+	-	+	-	-	-	+	-	-	III
<i>Erigeron acris</i>	-	+	-	-	+	+	+	+	-	+	+	+	IV
<i>Eryngium campestre</i>	+	+	-	-	-	-	-	-	-	-	-	-	I
<i>Euphorbia salicifolia</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Falcaria vulgaris</i>	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Festuca valesiaca</i>	-	-	-	+	-	+	-	-	-	+	-	-	II
<i>Filipendula vulgaris</i>	+	-	-	+	-	-	+	-	+	-	+	+	III
<i>Fragaria viridis</i>	-	+	+	-	-	-	-	-	-	-	-	+	III
<i>Galium album</i>	-	-	-	-	+	+	-	+	-	+	-	+	III
<i>Galium mollugo</i>	+	+	+	-	-	-	+	-	-	-	-	-	II
<i>Galium verum</i>	+	+	+	+	-	+	+	+	+	+	+	+	V
<i>Hypericum perforatum</i>	-	-	-	+	+	+	-	+	+	+	-	+	III
<i>Jurinea mollis</i>	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Lavatera thuringiaca</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Linum hirsutum</i>	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Medicago falcata</i>	-	-	-	+	+	2	-	+	-	2	-	-	III
<i>Medicago minima</i>	+	+	+	-	-	-	-	+	-	-	-	-	II
<i>Melampyrum cristatum</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Onobrychis viciifolia</i>	+	+	+	-	-	+	-	-	-	+	-	-	III
<i>Peucedanum cervaria</i>	-	-	+	+	-	-	-	-	-	-	-	-	I
<i>Phleum phleoides</i>	-	-	-	+	-	-	+	-	-	-	-	-	I
<i>Pimpinella saxifraga</i>	+	+	+	+	+	+	-	+	+	+	-	-	IV
<i>Plantago lanceolata</i>	-	-	+	+	+	+	-	-	-	+	+	+	III
<i>Plantago media</i>	+	+	+	-	-	+	-	+	-	+	-	-	III
<i>Polygala major</i>	-	+	+	-	-	-	-	-	-	-	-	-	I
<i>Rosa gallica</i>	-	+	+	-	-	-	-	-	-	-	-	-	I
<i>Salvia pratensis</i>	-	+	+	+	-	-	-	-	-	-	-	-	II
<i>Salvia verticillata</i>	+	-	+	-	-	+	-	-	-	+	-	-	II
<i>Scabiosa ochroleuca</i>	-	+	+	+	+	+	-	-	-	+	-	-	III
<i>Senecio jacobaea</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Seseli annuum</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Stachys germanica</i>	-	-	-	+	+	+	+	+	-	+	-	-	III
<i>Stachys recta</i>	-	-	-	-	+	+	-	-	-	+	.	-	II
<i>Teucrium chamaedrys</i>	-	+	+	+	+	+	-	-	-	+	-	-	III
<i>Thymus pulegioides</i>	-	+	+	+	+	-	-	-	-	-	-	-	II
<i>Trifolium campestre</i>	-	-	-	-	+	+	-	-	-	+	-	-	II
<i>Trifolium medium</i>	-	-	-	-	-	+	-	-	-	+	-	-	I
<i>Veronica spicata</i> ssp. <i>orchidea</i>	-	-	+	-	-	+	-	-	-	+	-	-	II

Querco-Fagetea													
<i>Allium scorodoprasum</i>	–	–	–	–	–	+	+	–	–	+	–	–	II
<i>Astragalus glycyphyllos</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Campanula bononiensis</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Crataegus monogyna</i>	–	+	–	–	–	+	–	–	–	+	–	–	II
<i>Pyrus pyrastrer</i>	–	–	–	+	–	+	–	–	–	+	–	–	II
<i>Rosa canina</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
Quercetea pubescenti-petraeae													
<i>Lembotropis nigricans</i>	+	+	–	–	–	–	–	–	–	–	–	–	I
Stellarietea mediae													
<i>Carduus acanthoides</i>	–	–	–	+	+	+	–	–	–	+	–	–	II
<i>Lathyrus tuberosus</i>	–	–	–	–	–	+	–	+	+	+	–	–	II
<i>Linaria vulgaris</i>	–	–	–	–	–	+	–	–	–	+	–	+	II
Origanetalia													
<i>Origanum vulgare</i>	–	–	–	–	+	+	–	–	–	+	–	–	II
Variae syntaxa													
<i>Althaea officinalis</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Carex hirta</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Clematis vitalba</i>	+	–	–	–	–	+	–	–	–	+	–	–	II
<i>Consolida regalis</i>	–	–	–	–	+	+	–	–	–	+	–	–	II
<i>Convolvulus arvensis</i>	–	–	–	–	–	+	–	–	–	+	–	+	II
<i>Cuscuta europaea</i>	–	–	–	+	–	–	–	–	–	–	+	–	I
<i>Dipsacus fullonum</i>	–	–	–	–	–	+	–	–	–	+	+	–	II
<i>Dipsacus laciniatus</i>	–	–	–	–	–	+	–	+	–	–	–	–	I
<i>Echinops sphaerocephalus</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Equisetum arvense</i>	–	–	–	+	–	+	–	+	–	+	+	–	III
<i>Equisetum telmateja</i>	–	–	–	+	–	–	–	–	–	–	+	–	I
<i>Inula britannica</i>	–	–	+	–	–	+	–	–	–	+	–	–	II
<i>Inula helenium</i>	–	–	–	–	–	+	–	+	–	+	–	–	II
<i>Medicago sativa</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Plantago major</i>	–	–	–	+	–	+	–	–	–	+	–	–	II
<i>Ranunculus polyanthemos</i>	–	–	–	–	–	–	+	+	+	–	–	–	II
<i>Rubus caesius</i>	–	–	–	–	–	+	–	–	–	+	–	–	I
<i>Rumex crispus</i>	–	–	–	+	+	–	–	+	+	–	–	+	II
<i>Scorzonera purpurea</i>	+	+	–	–	–	–	–	–	–	–	–	–	I
<i>Solidago gigantea</i> ssp. <i>serotina</i>	–	–	–	–	–	+	–	–	–	+	–	–	II

Species present in one relevé: *Helianthemum nummularium* (2), *Inula bifrons* (2), *Populus tremula* (2), *Quercus pubescens* (2), *Trifolium alpestre* (2), *Prunella laciniata* (3), *Verbascum phoeniceum* (3), *Campanula glomerata* (4), *Campanula persicifolia* (4), *Chamaespartium sagittale* (4), *Colchicum autumnale* (4), *Cruciata laevipes* (4), *Dianthus armeria* (4), *Euphorbia cyparissias* (4), *Euphrasia stricta* (4), *Fragaria vesca* (4), *Gladiolus imbricatus* (4), *Helleborus purpurascens* (4), *Hieracium pilosella* (4), *Juncus effusus* (4), *Lathyrus pratensis* (4), *Leontodon autumnalis* (4), *Luzula campestris* (4), *Primula veris* (4), *Salvia nemorosa* (4), *Trifolium pannonicum* (4), *Valeriana officinalis* (4), *Bromus arvensis* (5), *Elymus elongatus* (5), *Inula ensifolia* (5), *Lychnis flos-cuculi* (5), *Matricaria perforata* (5), *Nepeta nuda* (5), *Papaver rhoeas* (5), *Verbascum lychnitis* (5), *Verbena officinalis* (5), *Xanthium strumarium* (5), *Bromus commutatus* (7), *Bromus sterilis* (7), *Lolium perenne* (7), *Silene vulgaris* (7), *Urtica dioica* (7), *Vicia dumetorum* (7), *Artemisia vulgaris* (8), *Bromus erectus* (8), *Bromus japonicus* (8), *Lathyrus nissolia* (8), *Sedum maximum* (8), *Symphytum officinale* (8), *Veronica chamaedrys* (8), *Vicia grandiflora* (8), *Carex lepodocarpa* (11), *Carex pallescens* (11), *Juncus articulatus* (11), *Koeleria cristata* (11), *Phleum pratense* (11), *Poa pratensis* (11), *Euphorbia villosa* (12), *Galeopsis tetrahit* (12), *Lathyrus latifolia* (12), *Polygala comosa* (12), *Potentilla argentea* (12), *Viola canina* (12).

Location and date of relevés: **R1–2** – Criș, Gotca forest fringe, N 46°07', E 24°41'; 2004.06.23; **R3** – Saschiz, Gaura cu apă, N 46°08, E 24°57; 2004.07.15; **R4** – Saschiz, Gaura cu apă, upper area, N 46°08.765, E 24°54.211; 2004.07.15; **R5** – between Nou Săsesc and Rondola, N 46°08.903', E 24°35.749'; 2004.07.16; **R6** – Daia, N 46° 09.071', E 24° 53.387'; 2004.07.23; **R7,8,9** Saschiz, 22.06.2005, N 46°10', E 25°01'; **R10** – Daia, N 46°09.071', E 24° 53', 2006.07.18; **R11** – Vulcan, N 46°09', E 24° 50', 2006.07.19; **R12** – Fișer, N 46°04', E 25° 10', 2007.07.16

***Agrostio-Deschampsietum caespitosae* (Soo,1928) Ujvarosi 1947**

The association has been identified in Archita, Daia, Șaeș, and also in Fișer, between Țeline and Rețiș and Grânari (2007), on flat land, with excess soil moisture, at an altitude of 430–580 m. The flora of the association consists of 121 cormophytic species, most of them belonging to Molinietales order and Molinio-Arrhenatheretea class (Table 4).

Phytocoenoses have high productivity but their phytomass is of poor quality.

Table 4: *Agrostio-Deschampsietum caespitosae* (Soo,1928) Ujvarosi 1947

Relevé	1	2	3	4	5	6	7	8	
Altitude (ms.m)	567	566	555	582	436	528	509	573	
Area (m ²)	100	100	100	100	100	100	100	100	
Vegetation coverage (%)	96	94	98,5	94,5	95	93	92,5	99,5	K
Car.ass.									
<i>Agrostis stolonifera</i>	+	+	+	+	2	1	3	+	V
<i>Deschampsia caespitosa</i>	4	4	4	4	4	4	3	5	V
Molinietales									
<i>Alopecurus pratensis</i>	+	–	+	–	+	+	+	+	IV
<i>Caltha palustris</i> ssp. <i>laeta</i>	–	–	+	–	+	+	–	–	II
<i>Carex lepidocarpa</i>	1	+	–	–	–	–	–	–	II
<i>Centaurium pulchellum</i>	–	–	+	–	–	+	+	–	II
<i>Cirsium canum</i>	+	–	+	–	–	+	–	+	III
<i>Cirsium rivulare</i>	+	–	–	–	+	1	+	+	IV
<i>Epilobium palustre</i>	–	+	+	+	–	–	–	–	II
<i>Equisetum palustre</i>	+	–	+	–	+	–	+	+	IV
<i>Filipendula ulmaria</i>	–	–	–	–	–	+	–	+	II
<i>Galega officinalis</i>	–	–	+	–	–	–	+	–	II
<i>Galium uliginosum</i>	–	–	+	+	+	+	–	–	III
<i>Juncus articulatus</i>	1	2	+	–	+	–	+	–	IV
<i>Juncus effusus</i>	–	–	1	2	+	+	+	+	IV
<i>Juncus effusus</i> var. <i>agregatus</i>	1	–	–	–	–	+	–	–	II
<i>Juncus inflexus</i>	–	1	+	+	–	–	+	–	III
<i>Mentha longifolia</i>	–	–	+	+	–	–	+	+	III
<i>Mentha verticillata</i>	–	–	+	–	–	+	+	–	II
<i>Myosotis scorpioides</i>	+	+	+	+	+	–	+	–	IV
<i>Orchis coriophora</i>	+	–	–	–	–	–	–	–	I
<i>Dactylorhiza incarnata</i> ssp. <i>incarnata</i>	+	+	–	–	+	–	–	–	II
<i>Potentilla anserina</i>	+	–	+	+	–	–	+	–	III
<i>Symphytum officinale</i>	–	–	–	–	–	+	–	+	II
<i>Trifolium hybridum</i>	–	–	+	+	–	+	+	–	III
<i>Valeriana officinalis</i>	–	–	+	+	+	–	–	+	III
Molinio-Arrhenatheretea									
<i>Achillea millefolium</i>	+	–	+	–	+	+	+	–	IV
<i>Briza media</i>	+	+	+	–	–	–	–	–	II

<i>Carex distans</i>	—	+	+	—	—	—	—	—	II
<i>Carum carvi</i>	—	—	—	—	—	+	+	—	II
<i>Centaurea jacea</i>	+	+	+	—	+	—	—	—	III
<i>Cerastium holosteoides</i>	+	—	—	—	—	+	—	—	II
<i>Colchicum autumnale</i>	+	—	—	—	—	+	—	—	II
<i>Dactylis glomerata</i>	+	—	+	—	+	—	—	+	III
<i>Holcus lanatus</i>	—	+	+	+	+	+	—	—	IV
<i>Lathyrus pratensis</i>	—	—	—	+	+	—	—	—	II
<i>Lotus corniculatus</i>	+	—	+	—	+	+	—	—	III
<i>Lychnis flos-cuculi</i>	—	—	—	—	+	+	—	—	II
<i>Ononis arvensis</i>	—	—	+	+	—	—	—	—	II
<i>Plantago lanceolata</i>	+	—	+	—	—	—	—	—	II
<i>Potentilla erecta</i>	—	—	—	—	—	+	+	+	II
<i>Prunella vulgaris</i>	+	—	+	—	+	—	+	—	III
<i>Ranunculus acris</i>	+	+	+	—	—	+	+	—	IV
<i>Rhinanthus angustifolius</i>	+	+	—	—	—	—	—	—	II
<i>Rumex crispus</i>	+	—	+	—	—	—	—	—	II
<i>Stachys officinalis</i>	+	—	+	+	—	—	—	—	II
<i>Trifolium repens</i>	+	—	+	—	—	—	—	—	II
<i>Vicia cracca</i>	—	—	+	—	—	+	—	—	II
Arrhenatheretalia									
<i>Eryngium planum</i>	—	—	+	—	+	—	—	—	II
<i>Galium mollugo</i>	+	+	—	—	—	—	—	—	II
<i>Geranium pratense</i>	—	—	—	—	—	+	—	+	II
Magnocaricetalia									
<i>Carex vulpina</i>	—	+	+	+	—	—	+	—	III
<i>Galium uliginosum</i>	—	—	—	+	—	—	+	—	II
<i>Lathyrus palustris</i>	—	—	—	—	—	+	—	+	II
<i>Poa palustris</i>	—	—	—	—	+	+	—	—	II
<i>Scutellaria galericulata</i>	—	—	—	—	—	—	+	+	II
Phragmitetalia									
<i>Alisma plantago-aquatica</i>	—	—	+	+	—	—	—	—	II
<i>Epilobium hirsutum</i>	—	—	+	+	—	—	+	+	III
<i>Iris pseudacorus</i>	—	—	+	—	—	—	+	—	II
<i>Lycopus europaeus</i>	—	+	+	+	—	—	—	—	II
<i>Lythrum salicaria</i>	+	+	+	+	+	+	+	+	V
<i>Lysimachia vulgaris</i>	+	—	+	+	+	—	—	+	IV
<i>Polygonum amphibium</i> f. <i>terresre</i>	—	—	—	—	+	+	—	—	II
<i>Scirpus sylvaticus</i>	—	—	+	+	+	—	—	—	II
<i>Typha angustifolia</i>	—	—	+	+	—	—	—	—	II
<i>Veronica beccabunga</i>	—	—	+	+	—	—	—	—	II
Variae syntaxa									
<i>Dipsacus laciniatus</i>	—	—	+	—	—	+	+	—	II
<i>Erigeron acris</i>	+	—	—	—	+	+	+	—	III
<i>Juncus tenuis</i>	+	—	+	—	—	—	—	—	II
<i>Lysimachia nummularia</i>	+	+	+	+	—	+	+	—	IV
<i>Matricaria perforata</i>	—	—	—	—	—	+	+	—	II
<i>Plantago major</i>	—	—	+	—	—	+	—	—	II

<i>Ranunculus repens</i>	+	–	+	+	–	+	+	–	IV
<i>Rumex conglomeratus</i>	–	–	+	–	–	–	+	–	II
<i>Rumex sanguineus</i>	–	–	+	+	–	–	–	–	II
<i>Xanthium strumarium</i>	–	–	+	–	+	–	–	–	II

Species present in one relevé: *Festuca pratensis* (1), *Galium palustre* (1), *Leucanthemum vulgare* (1), *Phleum pratense* (1), *Poa pratensis* (1), *Poa trivialis* (1), *Trifolium pratense* (1), *Carex hordeistichos* (2), *Mentha aquatica* (2), *Convolvulus arvensis* (3), *Coronilla varia* (3), *Daucus carota* (3), *Euphorbia palustris* (3), *Heracleum sphondylium* (3), *Hypericum quadrangulum* (3), *Inula helenium* (3), *Stellaria graminea* (3), *Typha latifolia* (3), *Verbena officinalis* (3), *Vicia grandiflora* (4), *Vicia tetrasperma* (4), *Anthoxanthum odoratum* (5), *Eleocharis palustris* (5), *Medicago lupulina* (5), *Ranunculus acris* ssp. *strigosus* (5), *Centaureum erythraea* (6), *Conium maculatum* (6), *Epilobium parviflorum* (6), *Equisetum arvense* (6), *Festuca rubra* (6), *Lysimachia vulgaris* (6), *Mentha arvensis* (6), *Phragmites australis* (6), *Silene vulgaris* (6), *Agrimonia eupatoria* (7), *Althaea officinalis* (7), *Centaurea nigrescens* (7), *Inula hirta* (7), *Lathyrus latifolius* (7), *Calamintha clinopodium* (8), *Inula britannica* (8), *Inula salicina* (8), *Juncus conglomeratus* (8), *Scrophularia nodosa* (8), *Scutellaria hastifolia* (8).

Location and date of relevés:

R1 – Archita, Coastele Saschizului, N 46°10', E 25° 04', 2006.07.11; **R2** – Archita, Coastele Saschizului, N 46°10', E 25° 04', 2006.07.11; **R3** – Daia, La Podul Mare, N 46°08', E 24° 54', 2006.07.18; **R4** – Daia, La Podul Mare, N 46°07', E 24° 54', 2006.07.18; **R5** – Șaeș, lake, N 46°09', E 24° 46', 2006.07.22; **R6** – Fișer, N 46°04' E 25°09'; 2007.07.17; **R7** – between Țeline and Retiș; N 46°02', E 24° 53', 2007.07.30; **R8** – Grânari; N 46°01', E 24° 58', 2007.08.06.

***Cirsio cani-Festucetum pratensis* Májovsky ex Ruzicková 1975**

The syntaxonomic position of coenoses with *Festuca pratensis* remains questionable, being reported both in *Alopecurion pratensis* alliance and *Deschampsion caespitosae*. The inconsistencies in determining the syntaxonomic position are caused by the fluctuations of the hygrophilic and mesohygrophilic components, sometimes also adding the xero-mesophilic components. They grow on damp land, with high humidity, especially in the vernal season, in the rivers plains, on flat or slightly sloping land. The association is widespread near human settlements, where its expansion is driven by anthropogenic impacts. The constituents of the phytocoenoses have 80–99% coverage. In the studied area they have been identified in hilly level (Table 5) in Laslea, Fișer and Angofa. The floristic composition consists of 127 cormophytic species. The upper tier of vegetation is composed of the dominant species themselves, which reach approximately 40–45 cm: *Festuca pratensis*, *Agrostis stolonifera*, *Alopecurus pratensis* etc., and the lower tier is composed of the species: *Lotus corniculatus*, *Trifolium repens*, *Lysimachia nummularia* etc. Other important species are: *Agrostis capillaris*, *Briza media*, *Holcus lanatus*, *Leucanthemum vulgare*, *Stellaria graminea* etc.

Table 5: *Cirsio cani-Festucetum pratensis* Májovsky ex Ruzicková 1975

Relevé	1	2	3	4	5	6	7	8	9	10	
Altitude (m s.m.)	381	381	391	391	391	582	585	660	596	506	
Aspect	–	–	–	–	–	–	–	–	–	E	
Inclination	–	–	–	–	–	–	–	–	–	3	
Area (m ²)	100	100	100	90	100	100	100	100	100	100	
Vegetation coverage (%)	90	87	84	88,5	81,5	99	92	99,5	85	96,5	K
Car.ass.											
<i>Festuca pratensis</i>	4	4	4	4	4	4	4	3	4	4	V
Molinetalia											
<i>Agrostis stolonifera</i>	–	–	–	–	–	+	–	3	+	–	II

<i>Alopecurus pratensis</i>	+	—	—	+	+	+	—	—	+	—	III
<i>Colchicum autumnale</i>	—	—	+	—	+	—	—	—	—	—	I
<i>Genista tinctoria</i>	—	+	+	+	+	—	—	+	—	+	III
<i>Epilobium parviflorum</i>	—	—	—	—	—	—	+	—	+	—	I
<i>Juncus effusus</i>	+	—	+	—	+	—	—	—	—	—	II
<i>Linum catharticum</i>	—	—	+	+	—	—	—	+	—	—	II
<i>Lychnis flos-cuculi</i>	+	—	+	+	+	—	—	—	—	—	II
<i>Lysimachia nummularia</i>	—	—	+	+	—	—	—	+	—	—	II
<i>Mentha arvensis</i>	—	—	—	—	—	—	+	+	+	—	II
<i>Polygonum bistorta</i>	—	+	+	—	+	—	—	—	—	—	II
<i>Symphytum officinale</i>	+	+	+	—	+	—	—	+	—	—	III
<i>Trifolium hybridum</i>	+	—	—	+	—	—	+	+	1	—	III
Arrhenatheretalia											
<i>Agrostis capillaris</i>	+	1	+	+	—	+	—	+	+	—	IV
<i>Anthericum ramosum</i>	+	+	—	+	+	1	—	—	—	—	III
<i>Arrhenatherum elatius</i>	—	—	—	—	—	+	—	+	—	—	I
<i>Campanula patula</i> ssp. <i>patula</i>	—	—	+	+	+	+	+	—	—	+	III
<i>Carum carvi</i>	+	—	+	—	+	—	—	—	—	—	II
<i>Cichorium intybus</i>	+	—	+	+	—	—	—	+	+	+	III
<i>Crepis biennis</i>	—	—	—	—	—	—	+	—	+	+	II
<i>Cynosurus cristatus</i>	+	+	+	+	—	—	—	+	+	—	III
<i>Daucus carota</i>	+	—	+	—	+	—	+	+	+	+	IV
<i>Heracleum sphondylium</i>	—	—	+	—	+	—	—	+	—	—	II
<i>Knautia arvensis</i>	+	+	+	+	+	+	—	+	—	—	IV
<i>Lolium perenne</i>	+	+	+	+	—	—	—	—	—	—	II
<i>Myosotis arvensis</i>	—	—	—	—	—	—	+	—	+	—	I
<i>Plantago media</i>	+	+	+	—	+	—	—	—	—	+	III
<i>Prunella vulgaris</i>	+	+	+	+	—	+	—	—	—	—	III
<i>Rhinanthus rumelicus</i>	—	+	+	+	—	—	+	+	—	—	III
<i>Taraxacum officinale</i>	+	+	+	+	—	—	—	+	—	—	III
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	+	—	—	+	+	+	—	+	—	—	III
<i>Trisetum flavescens</i>	—	—	—	—	—	+	—	+	+	—	II
Molinio-Arrhenatheretea											
<i>Achillea millefolium</i>	+	+	+	+	+	—	—	+	—	—	III
<i>Ajuga genevensis</i>	—	+	+	+	—	—	—	—	—	—	II
<i>Anthoxanthum odoratum</i>	—	+	+	+	+	+	—	—	—	—	III
<i>Briza media</i>	+	—	+	—	+	+	—	+	—	+	III
<i>Centaurea jacea</i>	—	—	—	—	—	+	—	+	—	—	I
<i>Cerastium holosteoides</i>	—	+	+	+	+	+	—	—	—	—	III
<i>Dactylis glomerata</i>	+	+	—	+	+	+	+	—	+	+	IV
<i>Galium mollugo</i>	—	—	—	—	—	+	—	+	+	—	II
<i>Holcus lanatus</i>	+	+	+	—	+	+	—	+	—	—	III
<i>Leucanthemum vulgare</i>	+	+	+	+	+	1	2	+	—	—	IV
<i>Ononis arvensis</i>	+	+	—	+	+	+	—	+	+	—	IV
<i>Pastinaca sativa</i>	—	—	—	—	—	+	—	+	+	—	II
<i>Plantago lanceolata</i>	+	+	+	—	+	+	—	+	+	—	IV
<i>Polygala vulgaris</i>	—	—	—	—	—	+	—	+	—	—	I
<i>Ranunculus acris</i>	+	—	+	+	+	—	—	—	—	—	II
<i>Rhinanthus angustifolius</i>	+	+	+	—	+	—	—	—	—	—	II
<i>Rumex acetosa</i>	—	+	+	+	—	—	—	—	—	—	II
<i>Stachys officinalis</i>	+	—	+	+	—	+	—	+	+	—	III

<i>Stellaria graminea</i>	–	+	+	–	–	+	–	–	–	–	II
<i>Trifolium alpestre</i>	–	–	–	–	–	–	–	+	–	+	I
<i>Trifolium pratense</i>	–	+	+	+	–	+	+	+	–	+	IV
<i>Trifolium repens</i>	+	+	+	–	+	–	–	+	–	–	III
<i>Viola tricolor</i>	–	–	–	–	–	–	+	–	+	–	I
Festuco-Brometea											
<i>Agrimonia eupatoria</i>	+	–	–	–	+	–	+	+	+	+	III
<i>Anthyllis vulneraria</i>	+	+	–	+	–	–	–	–	–	–	II
<i>Asperula cynanchica</i>	+	+	–	–	–	+	+	–	+	+	III
<i>Brachypodium pinnatum</i>	–	–	–	–	–	+	–	–	–	+	I
<i>Bupleurum falcatum</i>	–	–	–	–	–	+	–	–	–	+	I
<i>Clinopodium vulgare</i>	+	+	–	–	–	–	–	–	–	+	II
<i>Coronilla varia</i>	+	–	–	+	+	–	–	–	–	+	II
<i>Dianthus carthusianorum</i>	+	+	–	+	–	+	–	+	–	–	III
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	–	–	–	–	+	–	–		–	2	I
<i>Erygeron acris</i>	+	–	+	+	+	–	+	+	–	–	III
<i>Eryngium campestre</i>	–	–	–	–	–	–	–	–	+	+	I
<i>Filipendula vulgaris</i>	+	–	–	+	–	–	–	–	–	+	II
<i>Fragaria viridis</i>	+	+	+	–	+	–	–	–	–	–	II
<i>Galium verum</i>	+	+	+	+	+	–	+	+	+	+	V
<i>Gentiana cruciata</i>	+	–	–	+	+	+	–	–	+	–	III
<i>Hieracium pilosella</i>	–	–	–	–	–	–	+	+	+	–	II
<i>Hypericum perforatum</i>	–	+	+	+	–	+	–	–	+	–	III
<i>Lotus corniculatus</i>	+	+	+	+	–	–	+	+	+	+	IV
<i>Medicago minima</i>	1	+	+	1	+	+	–	+	–	–	IV
<i>Onobrychis viciifolia</i>	–	–	–	–	–	+	–	–	+	+	II
<i>Peucedanum cervaria</i>	+	–	–	+	+	–	–	–	–	+	II
<i>Pimpinella saxifraga</i>	+	–	–	+	–	–	–	–	+	+	II
<i>Prunella grandiflora</i>	–	–	–	–	–	+	–	–	–	+	I
<i>Salvia nemorosa</i>	+	+	–	–	–	–	–	–	–	–	I
<i>Salvia pratensis</i>	+	+	–	–	+	–	–	–	–	+	II
<i>Salvia verticillata</i>	–	–	–	–	–	+	–	–	–	+	I
<i>Scabiosa ochroleuca</i>	–	–	–	–	–	+	–	–	–	+	I
<i>Thymus glabrescens</i>	–	–	–	–	–	–	–	+	–	+	I
<i>Verbascum phoeniceum</i>	–	+	–	+	–	–	–	–	–	–	I
<i>Veronica spicata</i> ssp. <i>orchidea</i>	–	+	–	+	–	–	+	–	–	–	II
<i>Vicia cracca</i>	–	–	–	–	–	+	–	+	–	–	I
Variae syntaxa											
<i>Bromus tectorum</i>	+	–	–	+	–	+	–	–	–	–	II
<i>Convolvulus arvensis</i>	–	–	–	–	–	–	–	+	–	+	I
<i>Crataegus monogyna</i>	–	–	–	–	–	+	–	–	+	–	I
<i>Equisetum arvense</i>	–	–	–	–	–	–	–	+	–	+	I
<i>Gypsophylla muralis</i>	–	–	–	–	–	–	+	–	+	–	I
<i>Laserpitium latifolium</i>	–	–	–	–	–	1	–	–	–	–	I
<i>Lathyrus tuberosus</i>	–	–	–	–	–	–	+	–	+	–	I
<i>Linaria vulgaris</i>	–	–	–	–	–	–	+	+	+	–	II
<i>Matricaria perforata</i>	–	–	–	–	–	–	+	–	+	–	I
<i>Rosa canina</i>	–	–	–	–	–	+	+	+	–	–	II
<i>Rosa gallica</i>	–	–	–	–	–	–	+	–	+	–	I

<i>Veronica chamaedrys</i>	–	–	+	–	+	+	–	–	+	–	II
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Species present in one relevé: *Teucrium chamaedrys* (2), *Bromus mollis* (6), *Campanula glomerata* (6), *Campanula persicifolia* (6), *Carex distans* (6), *Cerinth minor* (6), *Chamaecytisus albus* (6), *Elymus repens* (6), *Euphorbia epithymoides* (6), *Helleborus purpurascens* (6), *Helianthemum nummularium* (6), *Lembotropis nigricans* (6), *Orchis coriophora* (6), *Polygala major* (6), *Primula veris* (6), *Ranunculus polyanthemus* (6), *Stachys germanica* (6), *Centaurea nigrescens* (7), *Centaureum erythraea* (7), *Euphrasia rostkoviana* (8), *Melampyrum bishariense* (8), *Potentilla arenaria* (8), *Rumex sanguinea* (8), *Dipsacus laciniatus* (9), *Echium vulgare* (9), *Lamium purpureum* (9), *Medicago falcata* (9), *Bromus erectus* (10), *Carlina vulgaris* (10).

Location and date of relevé: **R1–5** – Laslea, N 46°11', E 24°38'; 2004.07.07; **R6** – Apold, N 46°06', E 24°50'; 2006.07.21; **R7** – Fișer, N 46°04', E 25°10'; 2007.07.16; **R8** – Fișer, N 46°04', E 25°07'; 2007.07.17; **R9** – Beia, N 46°09', E 25°10'; 2007.07.18; **R10** – Angofa, N 46°10', E 24°47'; 2007.08.07.

2. MESOPHILIC MEADOWS

They are mesophilic grassland belonging to the *Arrhenatheretalia* order. These secondary meadows are located on the slightly sloping hills.

The correspondence between habitat type in classification system used at European and Romanian level is:

NATURA 2000: 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

CLAS. PAL.: 38.2

HdR: R3802

Arrhenatheretum elatioris Br.-Bl. Scherrer ex 1925

Oatgrass meadows are common in hilly regions (385–557 m altitude). They develop mainly on eutrophic soils. Maintaining optimal conditions of the current phytocoenoses, and extending the areas occupied by oatgrass meadows, are conditioned both by regular fertilizing of the soil with organic or mineral fertilizers, and the prohibition of grazing in spring and autumn in those areas. The flora of the oatgrass meadows studied in this region is varied and rich, consisting of 212 cormophytic species (Table 6).

We have identified the representative coenoses of this association on flat land or slopes with gradient of 2°–15° and SE, N and E exposure, in the vicinity of Stejărenii, Mihai Bravu, Nou Săsesc, Beia, Ruja, Stejărișu and Angofa. Phytocoenoses are tiered and have a good coverage.

NATURA 2000: 6520 Mountain hay meadows

CLAS. PAL.: 38.31

HdR: R3801, R3803, R3804

Table 6: *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925

Relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	116	17	18	19	20	21	22	23	24	25	26	27
Altitude	385	501	490	635	510	447	447	447	531	531	563	563	447	507	675	666	669	650	640	611	613	490	635	647	514	476	453
Aspect	SE	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (°)	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area (m ²)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Vegetation coverage (%)	100	100	100	96	80,5	90,5	94,5	97,5	98	96,5	100	88,5	100	100	100	67	67	100	74	99	96,5	100	98,5	90	95,5	95,5	100
Car. ass.																											
<i>Arrhenatherum elatius</i>	4	5	3	4	3	4	4	3	4	4	4	4	4	4	4	4	3	5	4	4	4	4	4	4	4	3	2
Arrhenatheretalia																											
<i>Anthriscus silvestris</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Briza media</i>	+	+	+	+	+	-	+	+	-	+	+	1	+	+	+	-	+	-	-	+	+	+	+	+	+	+	-
<i>Campanula glomerata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Campanula patula</i> ssp. <i>patula</i>	+	-	+	-	+	-	-	-	-	+	-	+	+	+	+	-	+	+	-	+	+	+	+	-	+	-	+
<i>Carex flacca</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
<i>Carum carvi</i>	-	+	+	-	-	-	+	+	-	-	-	+	-	-	-	+	+	+	-	-	+	+	+	-	+	-	-
<i>Dactylis glomerata</i>	+	+	+	+	-	+	+	+	-	-	-	+	+	1	+	-	-	+	-	-	+	+	+	+	+	+	-
<i>Eryngium planum</i>	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<i>Euphrasia rostkoviana</i>	+	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Festuca pratensis</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
<i>Festuca rubra</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	+	-	-	-	-
<i>Galium mollugo</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+
<i>Gladiolus imbricatus</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
<i>Heracleum sphondylium</i>	-	-	+	-	-	-	-	+	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Knautia arvensis</i>	+	+	+	+	+	-	+	+	-	+	+	+	+	+	+	-	+	+	-	+	+	-	-	-	+	-	-
<i>Melilotus officinalis</i>	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
<i>Silene vulgaris</i>	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Stellaria graminea</i>	+	+	+	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	-	+	+	-	+	+	-	-	-
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	+	-	+	-	+	-	+	+	-	+	-	-	+	+	-	-	-	-	-	+	+	+	+	-	-	-	-
<i>Trifolium dubium</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-
<i>Trisetum flavescens</i>	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	+	-	-	-	-	+	+	-
<i>Veronica chamaedrys</i>	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

[illegible]

[illegible]

Species present in one relevé: *Jurinea mollis* (1), *Rorippa pyrenaica* (1), *Salvia nemorosa* (1), *Silene latifolia* ssp. *aba* (1), *Teucrium chamaedrys* (1), *Centaurea rhénana* (2), *Pullicaria vulgaris* (5), *Bromus japonicus* (6), *Teucrium montanum* (6), *Nonea pulla* (6), *Conyza canadensis* (14), *Potentilla thuringiaca* (14), *Prunus spinosa* (14), *Vicia grandiflora* (14), *Koeleria cristata* (17), *Elymus hispidus* (17), *Verbascum phlomoides* (19), *Nepeta nuda* (20), *Potentilla argentea* (20), *Dianthus armeria* (22), *Melampyrum bihariense* (23), *Filipendula ulmaria* (24), *Anthericum ramosum* (25), *Echinops spherocephalus* (25), *Geranium pratense* (25), *Lavatera thuringiaca* (25), *Cirsium rivulare* (26), *Hieracium pilosella* (26), *Aiuga genevensis* (27), *Calamagrostis epigeios* (27), *Imula hirta* (27), *Melampyrum arvense* (27), *Viola tricolor* (27).

Location and date of relevés: **R1** – Strejarieni, N 46°11', E 24°43', 2004.07.07; **R2** – Nou Săsesc, N 46°05', E 24°36', 2004.07.16; **R3** Mihai Viteazu, N 46°08', E 25°01', 2004.07.15; **R4,5** – Saschiz-Hotarul de Jos, N 46°12', E 24°59', 2005.06.17; **R6,7** – Saschiz to Daia, N 46°10', E 24°55', 2005.06.17; **R8** Saschiz to Daia, N 46°12', E 24°56', 2005.06.17; **R9, 10, 11, 12** – Mihai Viteazu "Fânate", N 46°09', E 25°02', 2005.06.18; **R 13–14,15** – Mihai Viteazu, "Fânate", N 46°09', E 25°02', 2005.06.19; **R16** – Cloaşterf, N 46°08', E 25°00', 2005.06.19; **R 17–19** Saschiz Volcos, N 46°10', E 25°01', 2005.06.30 ; **R20–21** – Saschiz Fața Soarelui, N 46°11', E 25°00', 2005.07.07; **R22** – Archira, Coastele Saschizului, N 46°10', E 25°04', 2006.07.11; **R23** – Șarpatoc, N 46°09', E 24°50', 2006.07.25; **R24**– Beia, N 46°07', E 25°09', 2007.07.18; **R25** – Ruja, N 46°08', E 24°54', 2007.07.23; **R26** – Strejarișu, N 46°01', E 24°41', 2007.07.24; **R27** – Angofa; N 46°10', E 24°46', 2007.09.27.

***Trisetum flavescens* (Schröter) Brockmann 1907**

Trisetum flavescens-golden oatgrass meadows occupy the slightly sloping hills, in the following localities: Archita, Fișer and Beia, at altitudes between 480–630 m. The flora of the association is diverse, consisting of 101 cormophytic species, of which most (54.45%) belong to coenotaxa characteristic to this class (Table 7). *Trisetum flavescens* phytocoenoses are tiered, in the upper level, besides edifying species, vegetate: *Agrostis capillaris*, *Arrhenatherium elatius*, *Cynosurus cristatus*, *Festuca pratensis*, *Knautia arvensis*, *Leucanthemum vulgare* etc., and the second level is composed of: *Carum carvi*, *Lotus corniculatus*, *Cerastium holosteoides*, *Trifolium pratense* etc. Other important species have been described: *Achillea millefolium*, *Onobrychis viciifolia*, *Daucus carota*, *Holcus lanatus*, *Dianthus carthusianorum* etc.

Conservation value of pastures is reduced.

Forage value of golden oatgrass meadows is good, with high productivity.

Table 7: *Trisetum flavescens* (Schröter) Brockmann 1907

Relevé	1	2	3	4	5	6	
Altitude (m s.m.)	486	544	580	580	588	633	
Aspect	–	–	–	–	–	S	
Inclination (°)	–	–	–	–	–	2	
Area (m ²)	100	100	100	100	100	100	
Vegetation coverage (%)	100	98,5	72	90,5	95	88,5	K
Carr.ass							
<i>Trisetum flavescens</i>	4	4	3	4	4	4	V
Arrhenatheretalia							
<i>Agrostis capillaris</i>	+	+	–	+	–	+	IV
<i>Arrhenatherium elatius</i>	+	+	–	–	–	+	III
<i>Campanula patula</i> ssp. <i>patula</i>	–	1	+	–	+	+	IV
<i>Carum carvi</i>	+	–	+	+	–	+	IV
<i>Crepis biennis</i>	+	+	–	+	–	–	III
<i>Eryngium planum</i>	+	–	+	+	+	–	IV
<i>Knautia arvensis</i>	–	1	+	+	+	+	V
<i>Phleum pratense</i>	+	+	–	+	+	+	V
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	+	–	+	+	+	+	V
<i>Trifolium dubium</i>	+	–	–	–	+	–	II
Molinio-Arrhenatheretea							
<i>Achillea millefolium</i>	+	+	+	–	+	+	V
<i>Alopecurus pratensis</i>	–	–	–	+	–	+	II
<i>Anthoxanthum odoratum</i>	+	+	–	–	–	+	III
<i>Briza media</i>	+	+	+	+	–	+	V
<i>Centaurea jacea</i>	–	+	+	+	+	+	V
<i>Centaureum erythraea</i>	–	–	+	+	–	–	II
<i>Cerastium holosteoides</i>	–	+	–	–	+	+	III
<i>Colchicum autumnale</i>	–	+	–	+	+	+	IV
<i>Convolvulus arvensis</i>	+	–	–	–	+	+	III
<i>Cynosurus cristatus</i>	+	+	–	+	–	–	III
<i>Dactylis glomerata</i>	1	+	+	+	+	+	V
<i>Daucus carota</i>	+	+	+	+	–	+	V
<i>Festuca pratensis</i>	1	+	–	+	+	–	IV
<i>Galium mollugo</i>	+	+	+	+	+	+	V
<i>Holcus lanatus</i>	+	–	+	+	+	+	V

<i>Leucanthemum vulgare</i>	—	+	+	—	2	+	IV
<i>Linum catharticum</i>	—	+	—	+	—	—	II
<i>Medicago lupulina</i>	1	—	+	—	+	—	III
<i>Ononis arvensis</i>	—	—	+	+	—	+	III
<i>Pastinaca sativa</i>	+	+	—	—	—	—	II
<i>Plantago lanceolata</i>	+	+	+	—	—	+	IV
<i>Poa pratensis</i> ssp. <i>angustifolius</i>	+	+	—	—	—	+	III
<i>Polygala comosa</i>	—	+	—	—	+	—	II
<i>Potentilla erecta</i>	—	—	—	—	+	+	II
<i>Ranunculus acris</i>	—	+	—	—	+	—	II
<i>Rhinanthus angustifolius</i>	—	1	2	+	—	—	III
<i>Stachys officinalis</i>	+	+	—	1	—	+	IV
<i>Taraxacum officinale</i>	+	+	—	—	—	—	II
<i>Trifolium hybridum</i>	+	+	—	—	+	—	III
<i>Trifolium pratense</i>	+	—	+	+	—	—	III
<i>Trifolium repens</i>	+	+	—	—	—	—	II
Molinietales							
<i>Agrostis stolonifera</i>	—	—	—	+	—	+	II
<i>Centaurea pulchellum</i>	—	—	—	+	+	—	II
<i>Cirsium canum</i>	+	+	—	—	—	—	II
<i>Genista tinctoria</i> ssp. <i>tinctoria</i>	—	—	+	+	—	—	II
<i>Mentha arvensis</i>	+	—	—	—	+	—	II
Festuco-Brometea							
<i>Agrimonia eupatoria</i>	+	+	+	+	—	+	V
<i>Asperula cynanchica</i>	—	+	—	+	—	+	III
<i>Bupleurum falcatum</i>	—	—	+	—	—	+	II
<i>Coronilla varia</i>	—	+	+	—	—	+	III
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	+	—	+	1	—	—	III
<i>Fragaria viridis</i>	+	—	—	+	—	+	III
<i>Galium verum</i>	+	+	+	+	—	+	V
<i>Hypericum perforatum</i>	—	—	—	+	—	+	II
<i>Lotus corniculatus</i>	—	+	—	+	—	+	III
<i>Plantago media</i>	+	—	+	—	—	+	III
<i>Pimpinella saxifraga</i>	+	—	—	—	—	+	II
<i>Rosa canina</i>	+	+	—	—	—	—	II
Querceto-Fagetea							
<i>Crataegus monogyna</i>	+	+	—	—	—	—	II
<i>Heracleum sphondylium</i>	+	—	+	—	—	—	II
<i>Pyrus pyraster</i>	—	—	—	+	+	+	III
Variae syntaxa							
<i>Cichorium intybus</i>	+	+	+	—	+	+	V
<i>Cuscuta europaea</i>	—	—	—	—	+	+	II
<i>Erigeron acris</i>	+	—	+	+	—	—	III
<i>Melilotus officinalis</i>	+	—	+	—	—	+	III
<i>Prunella vulgaris</i>	+	+	—	—	—	—	II
<i>Salvia verticillata</i>	+	+	+	—	—	—	III

Species present in one relevé: *Astragalus glycyphyllos* (1), *Dipsacus laciniatus* (1), *Echinops sphaerocephalus* (1), *Lathyrus pratensis* (1), *Vicia cracca* (1), *Ajuga reptans* (2), *Danthonia decumbens* (2), *Medicago falcata* (2), *Rumex crispus* (2), *Stellaria graminea* (2), *Elymus repens* (3), *Onobrychis viciifolia* (3), *Primula veris* (3), *Stachys recta* (3),

Dianthus carthusianorum (4), *Echium vulgare* (4), *Filipendula vulgare* (4), *Veronica spicata* ssp. *orchidea* (4), *Euphorbia virgata* (5), *Lathyrus tuberosus* (5), *Linaria vulgaris* (5), *Muscari comosum* (5), *Gentiana cruciata* (6), *Helleborus purpurascens* (6), *Origanum vulgare* (6), *Polygala major* (6), *Prunus spinosa* (6), *Ranunculus polyanthemus* (6), *Senecio jacobaea* (6), *Silene vulgaris* (6), *Thalictrum minus* (6), *Trifolium alpestre* (6), *Vicia sativa* (6).

Location and date of relevés: **R1** – Archita, N 46° 11', E 25° 04', 2006.07.08; **R2** – Archita, Coastele Saschizului, N 46° 10', E 25° 04', 2006.07.11; **R3** – Archita, Coastele Saschizului, N 46° 10', E 25° 04', 2006.07.11; **R4** – Fișer, N 46° 05', E 25° 10', 2007.07.16; **R5** – Fișer, N 46° 05', E 25° 10', 2007.07.16; **R6** – Beia, N 46° 08', E 25° 09', 2007.07.18

Festuco rubrae-Agrostietum capillaris Horvat 1951

Phytocoenoses cover flat land or slightly sloping hills (5°), present in the east and north of the following localities: Saschiz Laslea, Fișer, Beia, Netuș, Brădeni, at altitudes between 370–670 m.

The coenoses of this association grow well on brown, podzolic or brown-acid soil, with humus-rich content. Coenoses have a good coverage (90–100%), are tiered and rich in species (164 sp.). Along with the diagnostic species of the association, many species belonging to the high-rank syntaxonomic units can be met, for which the association has been reported, as well as a series of transgressive species from xero-mesophytic and xerophytic grasslands belonging to Festuco-Brometea class (Table 8).

Table 8: *Festuco rubrae-Agrostietum capillaris* Horvat 1951

Relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	
Altitude (m s.m.)	652	630	630	630	630	630	374	374	672	543	620	528	561	
Aspect	–	–	–	–	–	–	–	–	E	–	–	–	N	
Inclination (°)	–	–	–	–	–	–	–	–	5	–	–	–	5	
Area (m ²)	100	100	100	100	100	100	100	100	100	100	100	100	100	
Vegetation coverage (%)	91,5	101	100	99	100	100	95	98	93	99,5	98,5	97,5	90,5	K
Carr.ass.														
<i>Festuca rubra</i>	4	3	3	4	3	3	+	+	3	3	3	+	4	V
<i>Agrostis capillaris</i>	+	3	2	1	3	3	4	5	2	3	3	4	1	V
Arrhenatheretalia														
<i>Achillea millefolium</i>	+	+	+	+	+	+	+	+	–	+	+	+	+	V
<i>Ajuga reptans</i>	–	–	–	+	–	–	–	–	–	–	–	+	–	I
<i>Briza media</i>	+	+	+	+	+	+	+	+	2	+	1	+	+	V
<i>Carum carvi</i>	–	–	+	+	+	+	–	+	–	–	–	+	+	III
<i>Dactylis glomerata</i>	+	+	+	+	+	+	+	+	+	–	+	–	+	V
<i>Daucus carota</i>	+	+	+	–	–	+	+	–	–	+	+	+	+	IV
<i>Galium mollugo</i>	+	–	–	–	–	+	–	–	–	–	–	–	–	I
<i>Heracleum sphondylium</i>	+	–	–	+	–	–	–	–	–	–	–	–	–	I
<i>Knautia arvensis</i>	+	+	+	+	+	+	+	+	+	+	–	–	+	V
<i>Leontodon hispidus</i> ssp. <i>hispidus</i>	–	+	–	–	–	–	–	–	+	–	–	–	–	I
<i>Leucanthemum vulgare</i>	–	–	+	+	+	+	–	+	+	–	–	–	+	III
<i>Lotus corniculatus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	V
<i>Senecio jacobaea</i>	–	+	–	–	–	+	–	–	+	–	+	–	–	II
<i>Stellaria graminea</i>	+	+	+	+	+	+	+	+	–	–	+	–	–	IV
<i>Veronica chamaedrys</i>	+	–	+	+	–	–	–	–	–	+	–	–	–	II
<i>Vicia sepium</i>	–	+	–	–	+	–	–	–	–	–	–	–	–	I
Arrhenatherion														
<i>Arrhenatherum elatius</i>	+	–	+	–	+	–	–	–	–	+	–	+	–	II
<i>Campanula patula</i> ssp. <i>patula</i>	–	–	+	+	+	+	–	–	+	–	+	+	–	III

<i>Centaurea nigrescens</i>	+	+	+	–	+	+	–	–	+	–	+	–	–	III
<i>Lolium perenne</i>	–	–	+	–	–	+	–	–	+	–	–	–	–	II
Cynosurion														
<i>Cynosurus cristatus</i>	+	–	+	+	–	+	+	+	–	–	–	+	–	III
<i>Leontodon autumnalis</i>	+	–	+	–	–	–	–	–	–	–	–	–	–	II
<i>Phleum pratense</i>	+	–	+	+	+	–	–	–	+	–	–	–	–	II
<i>Trifolium repens</i>	+	+	+	+	–	–	–	–	+	+	–	–	–	III
Molinietalia														
<i>Agrostis stolonifera</i>	+	–	+	–	+	–	–	–	–	+	–	–	–	II
<i>Centaureum pulchellum</i>	–	–	–	–	–	–	–	–	+	–	–	+	–	I
<i>Linum catharticum</i>	–	–	–	+	–	–	–	–	+	–	+	–	–	II
<i>Lythrum salicaria</i>	–	–	+	+	–	–	–	–	–	–	–	–	–	I
<i>Myosotis scorpioides</i>	–	+	+	–	–	–	–	–	–	–	–	+	–	II
<i>Poa pratensis</i>	–	–	–	–	–	–	–	–	–	–	–	+	+	I
<i>Trifolium hybridum</i>	–	–	–	–	+	–	–	+	–	+	–	+	–	II
Molinion														
<i>Genista tinctoria</i>	+	+	+	+	+	+	–	–	+	+	+	–	–	IV
<i>Ranunculus polyanthemus</i>	+	–	+	+	–	–	–	–	–	–	+	–	–	II
<i>Stachys officinalis</i>	+	+	+	+	+	+	2	+	+	+	+	–	+	V
Molinio-Arrhenatheretea														
<i>Anthoxanthum odoratum</i>	+	–	+	–	+	+	+	–	–	–	+	–	–	III
<i>Centaureum erythraea</i>	+	–	+	+	+	–	–	–	+	+	–	+	–	III
<i>Cerastium holosteoides</i>	–	+	+	+	+	–	–	–	+	–	–	–	–	II
<i>Euphrasia rostkoviana</i>	–	–	–	+	+	–	+	–	–	–	–	–	–	II
<i>Festuca pratensis</i>	–	–	–	–	–	–	–	–	–	–	+	+	–	I
<i>Holcus lanatus</i>	+	+	+	+	–	+	+	–	–	+	–	+	–	IV
<i>Lathyrus pratensis</i>	+	–	–	–	+	–	–	–	–	+	–	–	–	II
<i>Leontodon hispidus</i>	–	–	–	–	–	–	–	–	–	–	+	–	+	I
<i>Ononis arvensis</i>	–	–	+	+	–	+	+	+	–	–	+	–	+	III
<i>Plantago lanceolata</i>	+	+	+	+	+	–	+	+	+	+	+	+	–	V
<i>Prunella vulgaris</i>	+	–	+	+	–	+	+	–	+	–	–	+	–	III
<i>Ranunculus acris</i>	–	+	–	–	+	–	–	–	–	–	–	–	–	I
<i>Rhinanthus angustifolius</i>	–	–	–	–	–	+	+	+	–	–	+	–	–	II
<i>Rhinanthus rumelicus</i>	–	–	+	+	–	–	–	–	–	–	+	–	+	IV
<i>Rumex acetosella</i>	–	–	+	+	–	–	–	–	–	–	–	–	–	I
<i>Rumex crispus</i>	+	+	–	–	–	+	–	–	–	+	–	–	–	II
<i>Thymus pulegioides</i>	+	+	+	+	+	–	+	+	+	–	–	+	+	IV
<i>Trifolium alpestre</i>	+	–	–	–	+	–	–	–	–	–	+	–	+	II
<i>Trifolium pratense</i>	–	+	+	+	–	+	+	–	–	+	–	–	+	III
<i>Vicia craca</i>	+	+	+	–	+	+	–	–	–	–	+	–	–	III
Festuco-Brometea s.l.														
<i>Agrimonia eupatoria</i>	+	+	+	–	+	+	+	+	+	+	–	–	+	IV
<i>Asperula cynanchica</i>	+	+	+	+	+	+	–	–	+	–	+	–	–	IV
<i>Brachypodium pinnatum</i>	+	+	+	–	+	+	–	–	–	–	–	–	–	II
<i>Bupleurum falcatum</i>	–	–	–	+	+	–	–	–	–	–	–	–	+	II
<i>Campanula glomerata</i>	–	+	–	–	+	–	–	–	–	–	–	–	–	I
<i>Carex hirta</i>	+	–	+	–	–	–	–	–	–	–	–	–	–	I
<i>Centaurea scabiosa</i>	–	–	–	–	–	–	+	+	+	–	–	–	+	II

<i>Clinopodium vulgare</i>	+	+	+	+	+	+	+	-	-	-	-	-	-	III
<i>Coronilla varia</i>	-	-	+	+	+	-	-	-	-	+	-	-	+	II
<i>Dianthus carthusianorum</i>	+	+	+	+	-	-	+	+	-	-	-	-	+	III
<i>Dorycnium pentaphyllum ssp. herbaceum</i>	+	+	+	+	+	+	-	-	+	1	+	-	-	IV
<i>Echium vulgare</i>	+	-	+	-	-	+	-	-	-	+	-	-	-	II
<i>Erigeron acris</i>	-	-	-	-	-	-	-	-	-	+	-	+	+	II
<i>Euphorbia cyparissias</i>	+	+	+	-	+	-	-	-	+	-	-	-	-	II
<i>Festuca valesiaca</i>	-	+	+	-	-	-	-	-	-	-	-	+	-	II
<i>Filipendula vulgaris</i>	+	+	+	+	-	+	-	-	-	-	+	-	-	III
<i>Fragaria viridis</i>	-	-	-	-	-	-	+	+	+	-	+	-	-	II
<i>Galium verum</i>	+	+	+	+	+	+	+	-	-	+	+	-	+	IV
<i>Helianthemum nummularium</i>	-	-	-	+	+	-	-	-	+	-	-	-	-	II
<i>Hieracium pilosella</i>	-	-	-	-	-	-	-	-	+	-	+	-	-	I
<i>Hypericum perforatum</i>	+	+	+	+	+	+	+	-	-	-	+	-	-	IV
<i>Linaria vulgaris</i>	+	-	+	-	-	-	-	-	-	+	-	+	-	II
<i>Medicago minima</i>	-	-	+	-	-	+	-	-	+	-	-	-	-	II
<i>Muscari comosum</i>	-	+	-	+	-	-	-	-	-	-	-	-	-	I
<i>Nepeta nuda</i>	-	-	+	+	+	-	-	-	-	-	-	-	-	II
<i>Onobrychis viciifolia</i>	-	-	-	+	-	-	-	+	-	-	-	-	+	II
<i>Pimpinella saxifraga</i>	-	+	+	+	-	-	-	-	-	-	+	-	+	II
<i>Plantago media</i>	+	+	+	+	-	-	+	+	+	+	+	+	+	V
<i>Polygala major</i>	-	-	+	+	+	-	-	-	+	-	-	-	-	II
<i>Potentilla arenaria</i>	-	-	-	-	-	+	-	-	+	-	-	-	-	I
<i>Potentilla recta</i>	+	+	+	+	+	+	-	-	-	-	-	-	-	III
<i>Prunella grandiflora</i>	+	-	-	-	+	-	-	-	+	-	-	-	-	II
<i>Prunella laciniata</i>	-	+	+	-	-	-	-	-	-	-	-	+	-	II
<i>Salvia verticillata</i>	-	-	-	+	-	-	-	-	-	-	-	-	+	I
<i>Scabiosa ochroleuca</i>	+	-	+	+	-	+	-	-	-	+	-	-	+	III
<i>Stachys germanica</i>	+	+	+	+	-	-	-	-	+	-	-	-	-	II
<i>Teucrium chamaedrys</i>	-	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Trifolium montanum</i>	+	-	+	-	-	+	-	-	-	+	-	-	-	II
<i>Veronica spicata ssp. orchidea</i>	-	-	+	+	+	+	+	-	-	+	-	-	-	III
Variae syntaxa														
<i>Allium scorodoprasum</i>	-	-	+	+	+	+	-	-	-	-	-	-	-	II
<i>Apera spica-venti</i>	-	-	-	-	-	-	-	-	-	-	-	2	-	I
<i>Astragalus glycyphyllos</i>	+	-	+	-	-	+	-	-	-	-	-	-	-	II
<i>Bromus mollis</i>	+	-	+	-	-	-	-	-	-	-	-	-	+	II
<i>Carduus acanthoides</i>	+	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Carex distans</i>	-	+	+	-	-	-	-	-	-	-	-	+	-	II
<i>Cichorium intybus</i>	+	+	+	+	+	-	+	-	-	-	-	-	-	III
<i>Colchicum autumnale</i>	-	-	+	+	+	+	-	-	-	-	+	+	-	III
<i>Convolvulus arvensis</i>	-	+	+	-	-	-	-	-	-	-	+	-	-	II
<i>Crataegus monogyna</i>	-	-	-	-	-	-	-	-	+	+	+	-	-	II
<i>Cruciata laevipes</i>	+	+	+	+	-	-	-	-	-	-	+	-	+	III
<i>Cuscuta europaea</i>	-	-	-	-	-	-	-	-	-	+	+	-	+	II
<i>Dianthus armeria</i>	+	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Elymus repens</i>	-	-	-	-	-	-	-	-	+	-	-	+	-	I
<i>Euphorbia salicifolia</i>	-	-	-	-	-	+	-	-	-	+	-	-	-	I
<i>Fragaria vesca</i>	-	+	+	+	-	-	-	-	-	-	-	-	-	II
<i>Helleborus purpurascens</i>	-	+	+	-	-	-	-	-	+	-	-	-	-	III
<i>Origanum vulgare</i>	-	-	-	-	-	-	-	-	+	-	-	-	+	I

<i>Ornithogalum pyramidale</i>	–	+	+	+	+	+	–	–	–	–	–	–	–	III
<i>Primula elatior</i>	+	–	+	–	–	+	–	–	–	–	–	–	–	II
<i>Rosa canina</i>	–	+	+	–	–	–	–	–	–	–	–	–	–	I
<i>Rosa gallica</i>	–	+	+	–	–	–	–	–	–	+	–	–	–	II
<i>Trifolium medium</i>	–	–	+	+	–	–	–	–	–	–	–	–	–	I
<i>Trifolium michrantom</i>	+	–	+	–	–	–	–	–	–	–	–	–	–	I

Species present in one relevé: *Anthyllis vulneraria* (2), *Lysimachia nummularia* (3), *Viola tricolor* (3), *Anthericum ramosum* (4), *Brassica elongata* (4), *Campanula persicifolia* (4), *Juncus effusus* (5), *Lavatera thuringiaca* (5), *Asparagus officinalis* (6), *Carex caryophylla* (6), *Deschampsia caespitosa* (6), *Sanguisorba officinalis* (6), *Chrysopogon gryllus* (7), *Eryngium campestre* (9), *Hypericum elegans* (9), *Polygala comosa* (9), *Lathyrus latifolius* (10), *Lathyrus tuberosus* (10), *Matricaria perforata* (10), *Mentha arvensis* (10), *Symphytum officinale* (10), *Trisetum flavescens* (10), *Stachys recta* (10), *Euphorbia virgata* (11), *Polygala vulgaris* (11), *Achillea collina* (12), *Filago vulgaris* var. *albida* (12), *Gypsophylla muralis* (12), *Inula bifrons* (12), *Lolium perenne* (12), *Nardus stricta* (12), *Rorippa pyrenaica* (12), *Astragalus cicer* (13), *Bromus erectus* (13), *Carlina vulgaris* (13), *Crepis biennis* (13), *Euphorbia salicifolia* (13), *Equisetum arvense* (13), *Falcaria vulgaris* (13), *Festuca rupicola* (13), *Gentiana ciliata* (13), *Medicago lupulina* (13), *Orobancha lutea* (13), *Phleum pratense* (13), *Salvia pratensis* (13).

Location and date of relevés:

R1 Saschiz, Fața Soarelui, N 46°11', E 25°00', 2004.07.13; **R2–4:** Saschiz Fața Soarelui, N 46°11', E 25°00', 2004.07.13; **R5,6** Saschiz, Cumisbol, N 46°11', E 25°00', 2004.07.13; **R7–8** Laslea, N 46°11', E 24°38', 2004.07.07; **R9** – Fișer, N 46°05', E 25°09', 2007.07.16; **R10** – Fișer, N 46°03', E 25°09', 2007.07.17; **R11** – Beia, N 46°08', E 25°09', 2007.07.18. **R12** – Netuș; N 46°04', E 24°48', 2007.07.28. **R13** – Brădeni; N 46°06', E 24°50', 2007.07.31.

***Anthoxantho-Agrostietum capillaris* Silinger 1933**

The phytocoenoses have been identified on the slopes of hills (520–660 m altitude), moderately sloping and on their platforms in the following localities: Apold, Șaeș, Brădeni and Netuș. The analyzed phytocoenoses include 94 cormophytic species in the floristic inventory, of which 57.44% characterize this association and its coenotaxa of high-ranks (Table 9). Grasslands are tiered, well represented, with coverage ranging between 90–100%. The upper tier of vegetation is represented by the dominant species *Agrostis capillaris* and *Anthoxanthum odoratum*, along with *Campanula patula* ssp. *patula*, *Leucanthemum vulgare*, *Dactylis glomerata*, *Daucus carota*, *Trisetum flavescens* etc. The most representative species in the lower tier are: *Trifolium repens*, *Cerastium holosteoides*, *Pimpinella saxifraga* etc.

The analyzed meadows have a mediocre production of green mass per hectare, but with good forage value.

Table 9: *Anthoxantho-Agrostietum capillaris* Silinger 1933

Relevé	1	2	3	4
Altitude (ms.m)	567	468	515	507
Aspect	–	S	–	–
Inclination (°)	–	3	–	–
Area (m ²)	100	100	100	100
Vegetation coverage (%)	92,5	100	100	100
Car.ass.				
<i>Agrostis capillaris</i>	2	3	4	4
<i>Anthoxanthum odoratum</i>	3	3	2	2
Arrhenatheretalia				
<i>Arrhenatherum elatius</i>	1	+	+	+
<i>Campanula patula</i> ssp. <i>patula</i>	+	+	+	+
<i>Carum carvi</i>	+	+	+	+

<i>Crepis biennis</i>	—	—	+	—
<i>Cynosurus cristatus</i>	+	+	—	—
<i>Euphrasia rostkoviana</i>	+	+	—	+
<i>Heracleum sphondylium</i>	—	+	+	—
<i>Knautia arvensis</i>	+	+	—	+
<i>Primula veris</i>	—	+	—	—
<i>Rhinanthus rumelicus</i>	+	+	—	—
<i>Senecio jacobaea</i>	+	—	—	+
<i>Trisetum flavescens</i>	+	+	—	+
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	+	—	—	+
<i>Veronica serpyllifolia</i>	—	—	+	—
Molinio-Arrhenatheretea				
<i>Achillea millefolium</i>	+	+	+	+
<i>Alopecurus pratensis</i>	+	—	+	+
<i>Anthericum ramosum</i>	+	—	—	—
<i>Briza media</i>	1	+	+	+
<i>Carex pallescens</i>	—	—	—	+
<i>Centaureum erythraea</i>	—	—	+	—
<i>Cerastium holosteoides</i>	—	+	—	+
<i>Dactylis glomerata</i>	+	+	+	—
<i>Daucus carota</i>	+	+	+	+
<i>Deschampsia caespitosa</i>	—	—	+	—
<i>Festuca pratensis</i>	+	+	+	+
<i>Festuca rubra</i>	—	—	+	+
<i>Filipendula ulmaria</i>	—	—	—	+
<i>Galium mollugo</i>	+	—	—	—
<i>Holcus lanatus</i>	+	+	+	—
<i>Inula britannica</i>	—	—	—	+
<i>Lathyrus pratensis</i>	—	—	+	—
<i>Leucanthemum vulgare</i>	+	+	—	+
<i>Linum catharticum</i>	—	+	—	+
<i>Lotus corniculatus</i>	+	+	+	+
<i>Medicago lupulina</i>	+	+	—	—
<i>Mentha longifolia</i>	—	—	+	—
<i>Mentha verticillata</i>	—	—	+	—
<i>Ononis arvensis</i>	+	+	—	—
<i>Phleum pratense</i>	—	—	+	—
<i>Plantago lanceolata</i>	+	+	+	—
<i>Polygala comosa</i>	—	+	—	—
<i>Potentilla erecta</i>	—	—	—	+
<i>Ranunculus acris</i>	—	—	+	—
<i>Ranunculus repens</i>	—	—	—	+
<i>Stachys officinalis</i>	+	+	+	+
<i>Stellaria graminea</i>	+	+	—	—
<i>Thalictrum flavum</i>	—	+	—	—
<i>Thymus pulegioides</i>	+	+	+	+
<i>Trifolium hybridum</i>	—	—	+	—
<i>Trifolium pratense</i>	—	+	+	—
<i>Trifolium repens</i>	+	—	+	—
<i>Viola canina</i>	—	—	+	—
Festuco-Brometea				
<i>Agrimonia eupatoria</i>	+	—	+	+
<i>Asperula cynanchica</i>	+	—	—	—

<i>Brachypodium pinnatum</i>	+	—	—	—
<i>Campanula glomerata</i>	+	—	—	—
<i>Centaurea scabiosa</i>	+	—	+	+
<i>Coronilla varia</i>	+	—	—	+
<i>Dianthus carthusianorum</i>	+	+	+	+
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	+	—	—	—
<i>Echium vulgare</i>	—	+	—	—
<i>Eryngium campestre</i>	+	—	—	—
<i>Filipendula vulgaris</i>	+	+	+	—
<i>Galium verum</i>	+	+	+	+
<i>Hypericum perforatum</i>	+	+	+	+
<i>Linaria vulgaris</i>	—	—	—	+
<i>Muscari comosum</i>	+	—	—	—
<i>Onobrychis viciifolia</i>	+	—	—	—
<i>Pimpinella saxifraga</i>	+	+	—	+
<i>Phleum phleoides</i>	+	—	—	—
<i>Plantago media</i>	+	+	+	—
<i>Polygala major</i>	+	—	—	—
<i>Salvia verticillata</i>	+	—	—	—
<i>Scabiosa ochroleuca</i>	+	+	—	+
<i>Stachys germanica</i>	+	+	—	—
<i>Thalictrum minus</i>	+	—	—	—
Variae syntaxa				
<i>Allium scorodoprasum</i>	+	—	—	—
<i>Campanula rapunculoides</i>	—	+	—	—
<i>Clinopodium vulgare</i>	—	+	+	+
<i>Convolvulus arvensis</i>	—	+	—	—
<i>Cruciata laevipes</i>	—	—	+	+
<i>Cuscuta europaea</i>	+	+	—	—
<i>Cichorium intybus</i>	+	+	—	+
<i>Erigeron acris</i>	—	+	—	—
<i>Equisetum arvense</i>	+	+	—	—
<i>Galeopsis speciosa</i>	—	—	—	+
<i>Genista tinctoria</i>	+	+	—	—
<i>Lembotropis nigricans</i>	—	+	—	—
<i>Melampyrum bihariense</i>	—	—	—	+
<i>Prunella vulgaris</i>	+	+	—	—
<i>Ranunculus polyanthemus</i>	+	+	+	+
<i>Trifolium alpestre</i>	—	+	—	—

Location and date of relevés:

R1 – Apold, N 46° 06', E 24° 50', 2006.07.21; **R2** – Șaeș, N 46° 07', E 24° 46', 2006.07.21; **R3** – Brădeni; N 46° 05', E 24° 47', 2007.07.28; **R4** – Netuș, N 46° 04', E 24° 48', 2007.07.28.

Conclusions

The identified phytocoenoses were reported to Molinio-Arrhenatheretea class according to the system proposed by the authors: Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993). Fourteen plant associations were identified, 97 relevés being performed.

In the flora of these meadows, a number of taxa in various stages of endangerment were identified, which are included in national red lists (Table 10): *Carex hordeistichos*, *Dactylorhiza incarnata* ssp. *incarnata*, *Gymnadenia conopsea*, *Orchis coriophora*, *Orchis tridentata*, *Euphorbia virgata*, *Inula bifrons*, *Ranunculus lingua*.

Table 10: List of vulnerable, rare and endangered species included in national red lists

IUCN CRITERIA	Taxon	Family
R	<i>Carex hordeistichos</i> Vill.	Cyperaceae
R	<i>Dactylorhiza incarnata</i> (L.) Soó <i>ssp. incarnata</i>	Orchidaceae
nt	<i>Euphorbia virgata</i> Waldst. & Kit.	Euphorbiaceae
R	<i>Gymnadenia conopsea</i> (L.) R.Br.	Orchidaceae
V	<i>Inula bifrons</i> (L.) L.	Asteraceae
R	<i>Orchis coriophora</i> L.	Orchidaceae
R	<i>Orchis tridentata</i> Scop.	Orchidaceae
R	<i>Ranunculus lingua</i> L.	Ranunculaceae

Abbreviations: R – Rare; V – Vulnerable; nt – not threatened.

REFERENCES

1. Akeroyd, J., 2001, *The flora and vegetation of Viscri, Mălâncrav and Surrounding countryside*, Report for the Mihai Eminescu Trust, September.
2. Akeroyd, J., 2007, Ruderal flora of the Saxon Villages (Transylvania, Romania): a neglected conservation constituency, *Transylvanian Review of Systematical and Ecological Research, The Saxon Villages Region of southeast Transylvania*, Sibiu-România, vol. 4: 65–72.
3. Barkman, J. J., Moravec, J., Rauschert, S., 1981, *Code der pflanzensoziologischen Nomenklatur*, Vegetatio, Upssala, vol. 67 (3): 145–195.
4. Boșcaiu, N. et.al., 1994, Lista roșie a plantelor vasculare dispărute, periclitare, vulnerabile și rare din flora României, *Ocrot. Nat. Med. Înconj.*, Tom 38: 1, 45–56.
5. Braun-Blanquet, J., 1964, *Pflanzensoziologie*, ed. III, Springer-Verlag ed., Wien, New-York.
6. Braun-Blanquet, J., Pavillard, J., 1928, *Vocabulaire de Sociologie Végétale*, ed. 3, Impr. Lemaire-Andres.
7. Burescu, P., 2003, *Flora și vegetația zonelor umede din nord-vestul României*, Ed. Acad. Române, București.
8. Cristea, V., Gafta, D., Pedrotti, F., 2004, *Fitosociologie*, Ed. Presa Universitară Clujeană, Cluj-Napoca.
9. Csűrös, Șt., Kovács, A., 1962, Cercetări asupra vegetației din raioanele Sighișoara și Agnita, *Contribuții Botanice*, Cluj: 205–232.
10. Doniță, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriș Iovu, A., 2005, *Habitatele din România*, Ed. Tehnică Silvică, București.
11. Doniță, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriș Iovu, A., 2006, *Habitatele din România, modificări conform amendamentelor propuse de România și Bulgaria la Directiva Habitare (92/43/EEC)*, Ed. Tehnică Silvică, București.
12. Drăgulescu, C., 2005, The Hydrophilous and Hygrophilous Flora and Vegetation of Târnave rivers, *Transylvanian Review of Systematical and Ecological Research*, 2, Sibiu-Romania: 13–30.
13. Gafta, D., Mountford, O., 2008, *Manual de interpretare a habitatelor Natura 2000 din România*, Ed. Risoprint, Cluj-Napoca.
14. Grabherr, G., Mucina, L., 1993, *Die Pflanzengesellschaften Österreich*, Teil II, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
15. Mountford, O., Akeroyd, J., 2005, A Biodiversity assessment of the Saxon Villages Rregion of Transylvania, *Transylvanian review of systematical and ecological research*, 2, Sibiu-Romania.
16. Mucina, L. et. al., 1993, *Die Pflanzengesellschaften Österreich*, Teil I, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
17. Mucina, L. et. al., 1993, *Die Pflanzengesellschaften Österreich*, Teil III, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
18. Oltean, M. et. al., 1994, Lista roșie a plantelor superioare din România, în *Studii, sinteze, documentații de ecologie*, 1, Acad. Română, Instit. de Biologie, București.
19. Oroian, S., 1998, *Flora și Vegetația Defileului Mureșului între Toplița și Deda*, Casa de Editură Mureș.
20. Pop, I. et. al., 2002, Vegetația județului Cluj (Studii fitocenologic, ecologic, bioeconomic și eco-protectiv), *Contribuții Botanice*, 35, Cluj-Napoca: 5–254.
21. Sanda, V., 2002, *Vademecum ceno-structural privind covorul vegetal din România*, Ed. Vergiliu, București.
22. Sămărgițan, M., 2005, *Flora și vegetația Văii Gurghiului*, Ed. University Press, Târgu-Mureș.

23. Săvulescu, Tr. (red.), 1952 – 1976, *Flora Republicii Populare Române și Flora Republicii Socialiste România*, I–XIII, Ed. Acad. Române, București.
24. Tutin, T. G., 1991, *Flora Europaea*, I, Ed. II, Cambridge University Press.
25. Tutin, T. G. et. al. (eds.), 1964–1980, *Flora Europaea*, 1–5, Cambridge University Press.

**PAJIȘTI MEZOFILE DIN CLASA MOLINIO-ARRHENATHERETEA
DIN SITUL SIGHIȘOARA-TÂRNAVA MARE
(Rezumat)**

Obiectivele prezentului studiu au constat în identificarea principalelor tipuri de habitate din situl Sighișoara-Târnava Mare-ROSCI0227, tipuri de pajiști seminaturale și a asociațiilor care le alcătuiesc, precum și identificarea plantelor vasculare din lista critică. Pajiștile cercetate aparțin județelor: Mureș, Sibiu, Brașov și Harghita. Aceste fânețe sunt încadrate în clasa *Molinio-Arrhenatheretea*, după sistemul preconizat de autorii: Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993). Observațiile și cercetările de teren din Podișul Târnavelor, în localitățile: Angofa, Apold, Archita, Beia, Brădeni, Cloașterf, Criș, Daia, Daneș, Fișer, Florești, Grânari, Iacobeni, Laslea, Mihai Viteazu, Movile, Mureni, Noiștat, Nou Săsesc, Ruja, Saschiz, Stejărenii, Stejărișu, Șaeș, Șarpatoc, Țeline și Vulcan (incluse în situl NATURA 2000 Sighișoara-Târnava Mare) s-au realizat în perioada 2003–2010, în perioadele de vegetație. Au fost identificate 14 asociații vegetale, efectuându-se 97 de relevee. În flora acestor pajiști au fost identificați o serie de taxoni aflați în diverse stadii de periclitate, taxoni europeni amenințați sau incluși în listele roșii naționale: *Carex hordeistichos*, *Dactylorhiza incarnata* ssp. *incarnata*, *Gymnadenia conopsea*, *Orchis coriophora*, *Orchis tridentata*, *Euphorbia virgata*, *Inula bifrons*, *Ranunculus lingua* etc.

THE WETLAND SOIL CONSERVATION STATUS ASSESSMENT USING PLANT INDICATORS AND REMOTE SENSING TECHNIQUES ON CARAORMAN AREA

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Abstract: Within this paper there are exposed a new approach of a few aspects regarding the determination and analyzing, the status of soil conservation, in the condition of the current climate change, based on variations that occur in the natural state of the indicator plants.

Compared with similar studies currently available, within this project we intend to offer a conceptual model, of the correlation between the soils status and indicator plants were using the spatial database and remote sensing techniques.

In this purpose, the few elements were used, as follows: the free Landsat 1990/2000 coverage maps of the Danube Delta Biosphere Reserve (<https://zulu.ssc.nasa.gov/mrsid/>), the data about soils and vegetation evolution, land observation (in the different point of the Danube Delta area) and a Quantum GIS version 1.5.0 and version 1.4.0 for map's visualization and editing, but for querying and processing data was used PostgreSQL.

All of them can be used, in order to understand the relation between soil and vegetation of the wetland areas. Within Geographical Information System, the information about wetlands can be manage very easy, in order to provides an explicit representation of the soil-vegetations relations conceptual model and a good support for model building on the information systems. The conservation status of the soils was represented on a matrix and that could be used to obtain forecasts.

Keywords: soil component, plant association, plant indicator, Caraorman sand bank

Introduction

Based on variations that occur in the natural state of the indicator plants, this paper aims to offer an efficient tool for identifying, analysing and forecast the evolution of soil characteristics, in the condition of the current climate change, using the spatial database and remote sensing techniques.

So, in order to get an action plan for habitat conservation we studied the space and time evolution of the relation between the indicator species and soil characteristics both on the G.I.S. environment and through field observations.

In this purpose, we chose the soil's cover and the spontaneous vegetation of the Caraorman sand bank as a reference model. Within this area, we followed the link between some aspect of the soils and vegetation evolution, in order to achieve a conceptual and mathematical model, of the correlation between the evolution of the soil characteristics and indicator plants using GIS software.

Material and method

The necessary stages for the achievement of the work are:

1. documents concerning about the Caraorman sand bank, shown in the data offer by specialists from: I.C.P.A. București, D.D.N.I. and O.J.S.P.A. Tulcea as well as in the scientific literature;
2. studying the cartographical materials as well as the free Landsat 1990/2000 coverage maps (<https://zulu.ssc.nasa.gov/mrsid/>), limite_SCI, SCI (http://www.mmediu.ro/departament_ape/biodiversitate/), the vectorial map “Datele Corine Land Cover 2000 reprojectate în Stereo70” (<http://earth.unibuc.ro/download/datele-corine-landcover-reprojectate-in-stereo70>) and “Limite unități relief” (<http://earth.unibuc.ro/download/romania-seturi-vectoriale>);
3. performing land observation, profiles opening and samples drawing at the soil horizon level;
4. centralization and processing of the data using GIS tools, as follows: Quantum GIS – 1.5.0 and PostgreSQL as data base management software;
5. evolution analysis and comparison between obtained data with those found in the scientific literature, as well as in other previous published papers.

Results and discussions

Caraorman sand bank is characterized by a relief with dunes, higher than the rest of the delta (12.4 m), on which the forest with the same name occurs. This forest represents a particular type of vegetation, the Danube Delta endemic habitat of periploca – poplar – oak – ash forests on Calcareous mobile sand (Nk.1), Calcareous Psamosol (Pk.1), Calcareous Molic Psamosol (Pp.1), Calcareous Marshy-Histic Psamosol (Ph.8), were the codes entered in parentheses are the map cod of the soils (Tab.1). Within this paper, the codes of Territorial Unit of Soil (soil components – after FAO criteria [10]) also have been used and these are following: NSka/N (Calcareous mobile sand), PSka/N (Calcareous Psamosol), PSmo/N (Calcareous Molic Psamosol), PStb/O (Calcareous Marshy-Histic Psamosol) (Tab. 1). The characterization of the soils units in relation to moisture can be done as: dry aestival – dry-low damp (Calcareous mobile sand), dry aestival – dry-low damp (Calcareous Psamosol), dry-low damp aestival – low damp (Calcareous Molic Psamosol), prevail damp-moist – moist-wet (Calcareous Marshy-Histic Psamosol). [1], [2], [3], [4], [7]

Within this area, on the soils types described above, it develops a vegetation of the Danubian-deltaic psamofile steppe in complex with forests of oak, ash, poplar. Those are characterized by the following associations: *Scabioso argenteae – Caricetum colchicae* (*Scabioso ucrainicae – Caricetum ligericae*), *Aperetum maritime*, *Fraxinetum pallise*, *Carici acutiformi*. [1], [2], [4]

All the information obtained from bibliographic studies, GIS data and land observation were used in order to obtain the vector layers with soils and vegetation data these were placed on the satellite map Landsat 1990/2000 coverage maps. [6] An important part of the database type table that containing information about the soil component is also presented in the first table (Tab. 1). The last column of the table contains codes of the soil components those are used as a key for the table of data relating to plant's associations.

The table head contain the name of column in attribute table attached to the shapefile (*.shp) and the notation as “C,80” represent: C from character and 80 the total number of characters with blank space at all these were established for record. [9]

Table 1: The soils type list (where: carbonatic = carbonate, molic = molic, histic = histic, carbonatic semifixat = mobile sand, nisipoasă = sandy, nisipuri fine = fine sands)

CLASA,C,80	COD_HAR,C,5	TIP,C,80	SUBTIP,C,80	TEXT,C,80	SUBSTR,C,80	COD_UTS,C,7
Protisoluri	Pk.1	Psamosol	carbonatic	nisipoasă	nisipuri fine	PSka/N
Protisoluri	Pp.1	Psamosol	molic	nisipoasă	nisipuri fine	PSmo/N
Protisoluri	Pp.1	Psamosol	molic	nisipoasă	nisipuri fine	PSmo/N
Protisoluri	Nk.1	Nisip	carbonatic semifixat	nisipoasă	nisipuri fine	NSka/N
Protisoluri	Pp.1	Psamosol	molic	nisipoasă	nisipuri fine	PSmo/N
Protisoluri	Pp.1	Psamosol	molic	nisipoasă	nisipuri fine	PSmo/N
Protisoluri	Ph.8	Psamosol	histic	Fără	nisipuri fine	PStb/O
Protisoluri	Pp.1	Psamosol	molic	nisipoasă	nisipuri fine	PSmo/N
Protisoluri	Ph.8	Psamosol	histic	Fără	nisipuri fine	PStb/O
Protisoluri	Nk.1	Nisip	carbonatic semifixat	nisipoasă	nisipuri fine	NSka/N

An important part of the **database type table** that containing information about plant's associations is **presented in the second table** (Tab. 2) and **first figure** (Fig. 1). Due to limitations of representation of data in GIS applications, each row of the table must contain a unique value, such as the polygons in the same layer do not overlap perfectly, because otherwise the application does not know how to manage them. [5], [6]

From that reason the correlation between the soils characteristics and plant associations, as well as the soil components and plant indicators must be achieved by introducing more columns to store data for plant associations or indicator plants (Tab. 1, 2, 3; Fig. 1, 2). This is the only way to achieve a relationship of type one (soils characteristics type) to many (plant associations or indicator plants type). The result is a matrix of plant associations or indicator plants type (ASOC_{ij} = plants association matrix, where "i" is number of soil component represented by COD_UTS and j = 1, ..., 4 – is number of plant associations). The UTS is from Unitate Teritorială de Sol (Territorial Unit of Soil or soil component – after FAO criteria [10]). [1], [3], [5], [6], [9]

Table 2: The plant associations type matrix
(where: Xerofite = Xerophyte, Mezo-xerofite = Mezo-xerophyte, Higrofit = Hygrophyte)

COD_UTS,C,7	CATEGORIE,C,16	ASOC_1,C,42	ASOC_2,C,42	ASOC_3,C,42	ASOC_4,C,42
PSka/N	Xerofite	<i>Aperetum maritimae</i>	–	–	–
PSmo/N	Mezo-xerofite	<i>Fraxinetum pallisae</i>	–	–	–
PSmo/N	Mezo-xerofite	<i>Fraxinetum pallisae</i>	–	–	–
NSka/N	Xerofite	<i>Scabioso argenteae – Caricetum colchicae</i>	–	–	–
PSmo/N	Mezo-xerofite	<i>Fraxinetum pallisae</i>	–	–	–
PSmo/N	Mezo-xerofite	<i>Fraxinetum pallisae</i>	–	–	–
PStb/O	Higrofit	<i>Caricetum acutiformis</i>	–	–	–
PSmo/N	Mezo-xerofite	<i>Fraxinetum pallisae</i>	–	–	–
PStb/O	Higrofit	<i>Caricetum acutiformis</i>	–	–	–
NSka/N	Xerofite	<i>Scabioso argenteae – Caricetum colchicae</i>	–	–	–

Table 3: The indicator plants species matrix
(where DN = species name and FR = frequency)

COD_	ASOC,	SP_IND_	SP_IND_	SP_IND_	SP_IND_	SP_IND_	SP_IND_	SP_IND_	SP_IND_
UTS,C,7	C,42	1DN,C,42	1FR,C,3	2DN,C,42	2FR,C,3	3DN,C,42	3FR,C,3	4DN,C,42	4FR,C,3
PSka/N	<i>Aperetum maritimae</i>	<i>Koeleria glauca</i>	F	<i>Potentilla recta</i> ssp. <i>recta</i>	F	<i>Xeranthemum annuum</i>	F	<i>Festuca beckeri</i>	F
PSmo/N	<i>Fraxinetum pallisae</i>	<i>Crataegus monogyna</i>	F	<i>Asparagus officinalis</i>	F	<i>Asparagus tenuifolius</i>	F	–	–
PSmo/N	<i>Fraxinetum pallisae</i>	<i>Crataegus monogyna</i>	F	<i>Asparagus officinalis</i>	F	<i>Asparagus tenuifolius</i>	F	–	–
NSka/N	<i>Scabioso argenteae</i> – <i>Caricetum colchicae</i>	<i>Koeleria glauca</i>	F	<i>Potentilla recta</i> ssp. <i>recta</i>	F	<i>Xeranthemum annuum</i>	F	<i>Festuca beckeri</i>	F
PSmo/N	<i>Fraxinetum pallisae</i>	<i>Crataegus monogyna</i>	F	<i>Asparagus officinalis</i>	F	<i>Asparagus tenuifolius</i>	F	–	–
PSmo/N	<i>Fraxinetum pallisae</i>	<i>Crataegus monogyna</i>	F	<i>Asparagus officinalis</i>	F	<i>Asparagus tenuifolius</i>	F	–	–
PStb/O	<i>Carietumi acutiformis</i>	<i>Carex acutiformis</i>	F	<i>Stachys palustris</i>	F	<i>Scutellaria galericulata</i>	F	–	–
PSmo/N	<i>Fraxinetum pallisae</i>	<i>Crataegus monogyna</i>	F	<i>Asparagus officinalis</i>	F	<i>Asparagus tenuifolius</i>	F	–	–
PStb/O	<i>Caricetum acutiformis</i>	<i>Carex acutiformis</i>	F	<i>Stachys palustris</i>	F	<i>Scutellaria galericulata</i>	F	–	–
NSka/N	<i>Scabioso argenteae</i> – <i>Caricetum colchicae</i>	<i>Koeleria glauca</i>	F	<i>Potentilla recta</i> ssp. <i>recta</i>	F	<i>Xeranthemum annuum</i>	F	<i>Festuca beckeri</i>	F

These data, stored in vector layers (both tabular and polygons form) were imported through the PostGIS on PostgreSQL and finally processing with that (Fig. 3) through SQL (Structured Query Language) statements those were edited on text mode and interpreted by PostgreSQL engine. [8]

Within Caraorman sand bank, due to reduced fertility of the sandy soil there a good correlation between the area occupied by the soils component and plants associations. If in addition to indicator species for the soil hydric characteristics we will use indicator species for other characteristics of the soils will be obtain a matrix of the soils characteristic state states.

Within the plant associations and soil component, any change in the distribution and frequency of indicator species provides a quick indication of the soil evolution.

Thus the appearance of species characteristic of a particular plant association in the other associations in the bordering area between the two is an indication of soil evolution (which there are two associations) and the direction in which it will do (if are changes: humidity, pH, texture, quantity of humus, salinity, etc.).

According to the data presented in this paper, the hydric characteristics of the soils in the Caraorman sand bank area these are within the optimum parameters for the in the studied soils units.

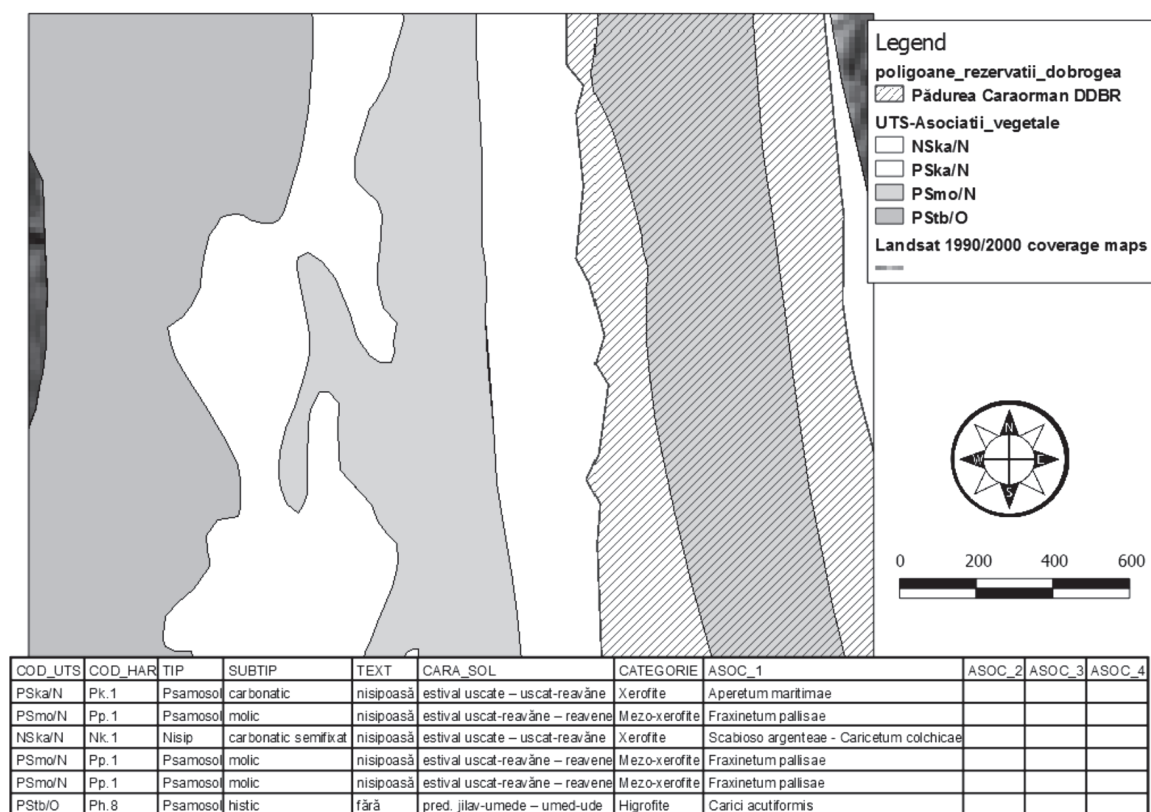


Fig. 1: The distribution plants association on types of soil components

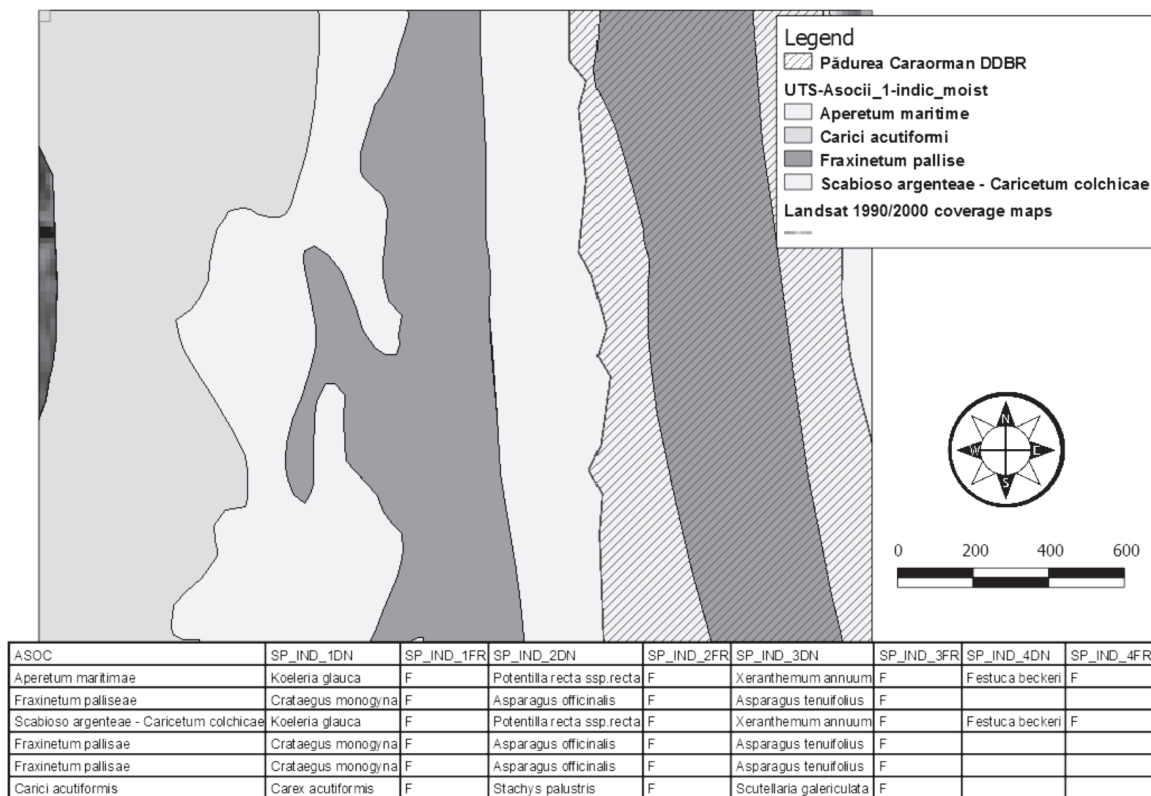


Fig. 2: The distribution of indicator plants species on types of association

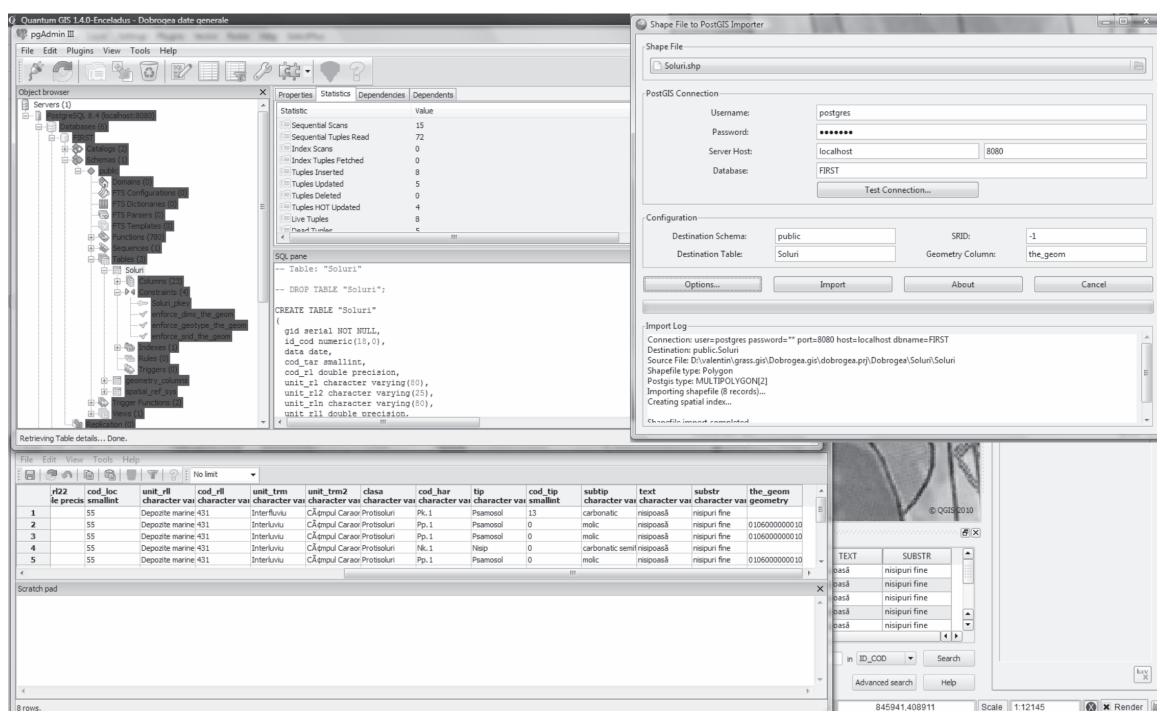


Fig. 3: Importing data on PostgreSQL through PostGIS and their processing

REFERENCES

1. Doniță, N., Popescu, A., Mihaela, Paucă-Comănescu, Simona, Mihăilescu, Biriș, I., 2005, *Habitatele din România*, Editura Tehnică Silvică, București.
2. Găstescu, P., Driga, B., Anghel, Cornelia, 1983, Caracteristicile morfohidrografice ale Deltei Dunării ca rezultat al modificărilor naturale și antropice actuale, *Hidrobiologia*, vol. 18: 29–42.
3. Puiu, Șt., 1980, *Pedologie*, Editura Ceres, București: 84.
4. Romanescu, Gh., 1996, *Delta Dunării – Studiu morfohidrografic*, Editura Corson, Iași: 130.
5. *** Built-in Datums, Global Mapper Software LLC, http://www.globalmapper.com/helpv10/datum_list.htm
6. *** Landsat 1990/2000 coverage maps, NASA, <https://zulu.ssc.nasa.gov/mrsid/>
7. *** *Soils of the Romanian Danube Delta Biosphere Reserve* (studiu elaborat de I.C.P.D.D., A.R.B.D.D., I.C.P.A. București – România și R.I.Z.A. – Olanda), 1996.
8. *** PostgreSQL 8.4.3 Documentation, The PostgreSQL Global Development Group, 2009, <http://www.postgresql.org/docs/>
9. *** ESRI Shapefile Technical Description – An ESRI White Paper—July 1998, Environmental Systems Research Institute, Inc., 380 New York Street, Redlands, CA 92373–8100 USA, 1998, <http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf>
10. *** Global and National Soils and Terrain Digital Databases (SOTER) – Procedures Manual (revised edition), International Soil Reference and Information Centre, edited by V.W.P. van Engelen and T.T. Wen, 1995, http://www.isric.org/isric/webdocs/Docs/SOTER_Procedures_Manual_1995.pdf

**EVALUAREA STĂRII DE CONSERVARE A SOLURILOR DIN ZONELE UMEDE
FOLOSIND PLANTE INDICATOARE ȘI TEHNICI DE TELEDETECȚIE ÎN ZONA CARAORMAN
(Rezumat)**

În cadrul acestei lucrări sunt expuse câteva aspecte privind determinarea și analizarea stării de conservare a solului, în condițiile schimbărilor climatice actuale, pe baza variațiilor care apar în repartiția și frecvența speciilor de plante indicatoare.

Comparativ cu studii similare disponibile în prezent, în cadrul acestei lucrări ne propunem să oferim un model conceptual, bazat pe corelația dintre starea solurilor și a plantelor indicatoare, prin utilizarea de baze de date spațiale și de tehnici de teledetecție.

În acest scop au fost utilizate: Landsat 1990/2000 coverage maps a Rezervației Biosferei Delta Dunării (<https://zulu.ssc.nasa.gov/MrSID/>), datele bibliografice și din teren despre soluri și vegetație, precum și Quantum GIS versiunea 1.5.0 și 1.4.0 pentru vizualizarea și editarea hărților. Pentru partea de interogare și prelucrare a datelor a fost folosit PostgreSQL.

Toate acestea pot fi utilizate pentru corelarea tipurilor de sol și a fertilității acestora cu starea vegetației, atât pentru caracterizarea habitatelor din cadrul zonelor umede, cât și din alte zone.

Starea de conservare a solurilor a fost reprezentată pe o matrice ce ar putea fi folosită pentru a obține previziuni și care a produs bune rezultate în cazul acestei lucrări, indicând o stare bună a solurilor.

Astfel, apariția unei specii caracteristice pentru o anumită asociație vegetală în cadrul altei asociații, în zona limitrofă dintre cele două, este un indiciu asupra evoluției solurilor (pe care se găsesc cele două asociații) și a direcției în care aceasta se va face (dacă se modifică umiditatea, pH-ul, textura, cantitatea de humus, salinitatea etc.).

THE VEGETATION OF SHRUBS IN MOREȘTI AREA (MUREȘ COUNTY)

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Abstract: This paper presents a description of shrub vegetation from the Morești village area. The studied phytocenoses are situated on hilly area right side nearby the Mureș Valley downstream Târgu-Mureș.

The identified phytocenoses were framed to Galio-Urticetea and Rhamno-Prunetea classes. Three plant associations were identified *Sambucetum ebuli* Felföldy 1942, *Pruno spinosae-Crataegetum* Soó (1927) 1931 and *Prunetum tenellae* Soó 1947. For these shrubs flora several threatened and rare taxa were identified being included in the national and international red lists.

Keywords: Morești, vegetation description, shrubs vegetation, plant associations.

Introduction

The overall objective of this research is to contribute to a better knowledge of the flora and vegetation of this area. The specific objectives are to investigate plant communities and assess the presence of certain endangered species in these shrubs flora.

Physical and geographical features

The studied shrubs are located on a hilly area, on the north side of the Mureș River Valley downstream of Târgu-Mureș, at 400–480 m elevation.

Geographically, a common characteristic of this region is long-peaked reliefs with abrupt out cropping, generally situated under 600 m above large valleys with low sloped sides. The most frequently found soil is forest acid brown.

The area is characterized by a temperate continental climate. The yearly average temperature is 8.8 °C and the yearly average rainfalls quantity is 615.4 mm/m². This climate is responsible for the actual floristic diversity.

Along the fringe of *Quercus robur* woods, *Prunus tenella* and *Prunus spinosa* bushes can be met.

Material and methods

This research is based on field observation. The main method of study was the most frequent and appreciable of Montpellier School, the Braun-Blanquet method.

In accordance with the research work performed in 2009 and 2010, three plant associations were identified in the area we studied, their phytocoenoses being framed in Galio-Urticetea

and Rhamno-Prunetea classes by Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) [9, 10] classification system.

For each syntaxonomic unit, territorial spreading, floristical composition, biological structure, phytogeographic elements and ecological behavior correlated with plants' needs for humidity, temperature and soil pH are mentioned in the paper. A diploid and polyploid species graphic distribution was made as well.

The present study includes all phytosociological data and attempts to realize a phytosociological classification of these shrubs.

Nomenclature of species is consistent with Flora Europaea [18, 19]. Systematic classification of taxa was made according to Code de Tokyo, 1993 [2]. Syntaxonomic classification was based on consulting the most recent classification papers at European level [9, 10] and also on synthetic works developed on the vegetation of Romania [6, 16].

The habitat types are coded according to Interpretation Manual of Natura 2000 Romanian habitats, developed and printed in Romania under the PHARE project "Implementation of NATURA 2000 in Romania" [8] and according to Habitats in Romania [7].

Results and discussions

In the studied area three plant associations were described, belonging to *Rhamno-Prunetea* and *Galio-Urticetea* classes.

GALIO-URTICETEA Passarge ex Kopecký 1969

Lamio albi-Chenopodietalia boni-henrici Kopecký 1969

Galio-Alliarion (Oberd. 1957) Lohmeyer et Oberd. in Oberd. et al. 1967

Sambucetum ebuli Felföldy 1942

RHAMNO-PRUNETEA Rivas Goday et Borja Carbonell 1961

Prunetalia R.Tx. 1952

Prunion spinosae Soó 1951

Pruno spinosae-Crataegetum Soó (1927) 1931

Prunion fruticosae R.Tx. 1952

Prunetum tenellae Soó 1947

Vegetation description

In the studied area, hedges grown in the place of forests or at the edge of forests, on balks, etc., are represented by mesophilic clusters, blackthorn and hawthorn shrubbery considered to belong to *Pruno spinosae-Crataegetum* association. Subcontinental peripanonical shrubs of Dwarf Russian almond (*Prunus tenellae*) have been also identified.

Sambucetum ebuli Felföldy 1942

Sambucus ebulus is dominant in some ruderal associations, forming high weeds. Besides the recognizing species of *Sambucus ebulus*, accompanying species like: *Galium aparine*, *Urtica dioica*, *Artemisia vulgaris*, *Dactylis glomerata*, are found in the composition of the coenoses, but generally, in clumps of *Sambucus ebulus*, few species are found.

In the studied area, coenoses inhabit soils less compact and rich in organic substances, from the shores of the Mureș River and up the slopes, reaching altitudes of 360–400 m. In the

floristic composition of the association diagnostic species of the class and order can be found, and also a series of species belonging to *Artemisietea vulgaris* and *Epilobietea angustifolii* classes. The edifying species, *Sambucus ebulus*, distinguishes itself by a high coverage and consistency (Table 1). With its characteristic habitus, danewort gives a particular physiognomy to these phytocoenoses.

Depending on moisture, temperature and soil reaction factors, (Fig. 1), mesophilous (47.23%), micro-mesothermal (69.45%), and low-acid neutrophilous species (36.12 %) have the leading role in the association.

The predominant bioforms are hemicryptophytes (69.44%), followed by terophytes (25%), (Fig. 2).

In the forming of the floristic composition of the association, the Eurasian species (27.28%), and Paleotemperate species (22.23%) are predominant. Also, a significant number of Eurosiberian species (11.2%) and Circumpolar species (11.12%) (Fig. 3) can be found.

In the caryological spectrum (Fig. 4) the predominate species are diploid (52.78%), followed by the polyploid species (44.45%). Diplo-polyploid species are present in a percentage of 2.78%.

Table 1: *Sambucetum ebuli* Felföldi 1942

Relevee	1	2	3	4	5	
Altitude (m s.m.)	380	380	400	380	360	
Aspect	–	–	SV	S	SV	
Inclination (°)	–	–	5	10	5	
Area (m ²)	100	100	100	100	100	
Vegetation coverage (%)	95	70	70	52	100	K
Gallio-Alliarion						
<i>Lamium maculatum</i>	+	–	+	+	+	IV
<i>Geranium robertianum</i>	–	+	–	–	+	II
<i>Chelidonium majus</i>	–	–	–	–	+	I
Lamio albi-Chenopodietea boni-henrici						
<i>Sambucus ebulus</i>	5	4	4	3	5	V
Galio-Urticetea						
<i>Urtica dioica</i>	+	+	+	+	+	V
<i>Galium aparine</i>	–	–	+	1	+	III
<i>Silene alba</i>	–	–	–	+	+	II
Convolvuletalia sepium						
<i>Calystegia sepium</i>	+	+	+	+	+	V
<i>Cuscuta europaea</i>	–	+	+	+	–	III
Epilobietalia angustifolii						
<i>Centaureum erythrea</i>	+	+	–	+	–	III
<i>Solidago virgaurea</i>	–	–	+	–	+	II
<i>Digitalis grandiflora</i>	–	–	+	–	–	I
Trifolion medii						
<i>Agrimonia eupatoria</i>	+	–	+	–	+	III
<i>Vicia sepium</i>	–	+	–	+	–	II
Variae syntaxa						
<i>Artemisia vulgaris</i>	–	+	+	+	+	IV
<i>Knautia arvensis</i>	+	+	–	+	+	IV
<i>Conium maculatum</i>	–	+	+	–	+	III
<i>Convolvulus arvensis</i>	+	–	–	+	+	III
<i>Dactylis glomerata</i>	–	–	+	+	+	III

<i>Eryngium campestre</i>	—	+	+	—	+	III
<i>Euphorbia cyparissias</i>	+	+	—	—	+	III
<i>Galium verum</i>	+	+	—	+	—	III
<i>Mentha arvensis</i>	—	+	+	—	+	III
<i>Prunella vulgaris</i>	—	+	+	+	—	III
<i>Arctium lappa</i>	—	—	+	+	—	II
<i>Centaurea rhenana</i>	+	—	—	—	+	II
<i>Crataegus monogyna</i>	+	—	—	—	+	II
<i>Dipsacus laciniatus</i>	+	—	—	+	—	II
<i>Inula britannica</i>	—	+	—	+	—	II
<i>Ononis spinosa</i>	—	+	—	—	+	II
<i>Symphytum officinale</i>	—	—	—	+	+	II
<i>Thalictrum aquilegifolium</i>	+	—	+	—	—	II
<i>Origanum vulgare</i>	—	—	—	—	+	I
<i>Potentilla erecta</i>	+	—	—	—	—	I
<i>Stachys germanica</i>	+	—	—	—	—	I
<i>Trifolium pratense</i>	—	—	—	+	—	I

Place and date of releves: R1–2 Morești 13.07.2009, R 3–4 Morești 06.06.2010, R 5 Morești 08.08.2010

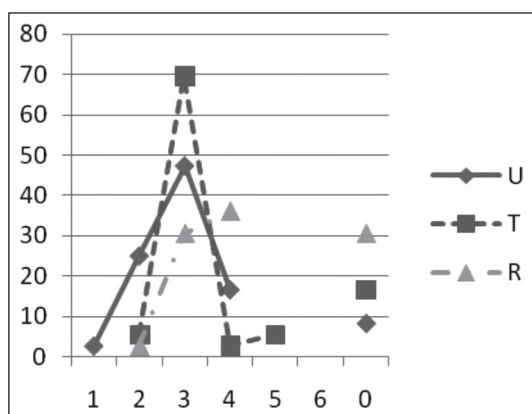


Fig. 1: Ecological indices of *Sambucetum ebuli* association

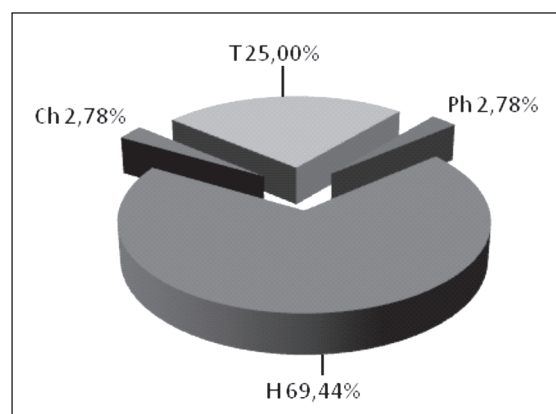


Fig. 2: Bioforms spectrum of *Sambucetum ebuli* association

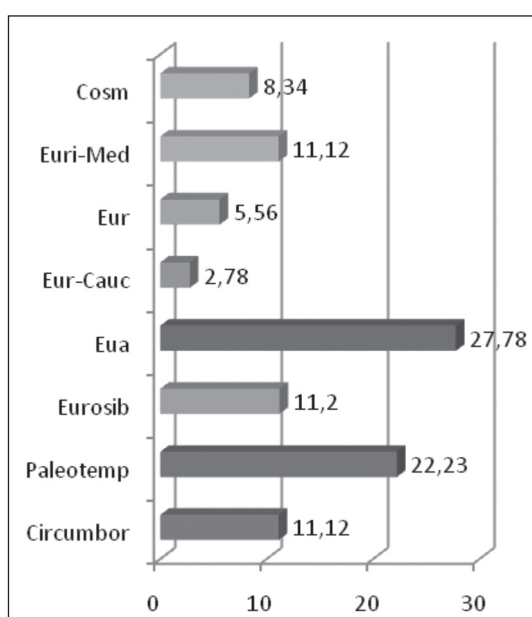


Fig. 3: Floristical elements of *Sambucetum ebuli* association

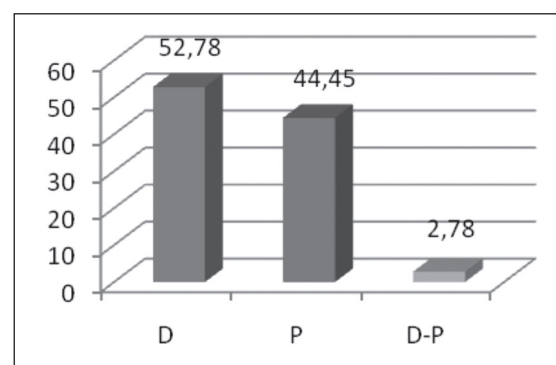


Fig. 4: Caryological spectrum of *Sambucetum ebuli* association

***Pruno spinosae-Crataegetum* Soó (1927) 1931**

It is the most common shrub association in the investigated area. It is encountered mainly in agricultural territories of planar level to the hill level. In the studied area, it is found at altitudes between 400–450 m, on slopes with western and south-west exposure. In addition to shrub species, many transgressive species of *Quercio-Fagetea* and *Festuco-Brometea* classes (Table 2) were found in the studied clumps. Due to the diversity of flora components, the association is developing under large amplitude of stationary conditions. Being under intense anthropogenic influences, the association is often destabilized, or even destroyed, but has a great capacity for regeneration.

The soil and climate condition, in which the association develops, promotes the development of mesophilous (26.09%) and xeromesophilous (52.18%) species. Temperature promote micro-mesothermal (59.42%) and soil pH promote low-acid neutrophilous (42.03%) and euryionic species 27.54% (Fig. 5).

The inclusion of the studied territory in the temperate, non-arid climate region is confirmed by the presence of a large number of hemicryptophytes (71.01%), along with a significant number of terophytes (8.7%). Phanerophytes are present in a percentage of 14.49% (Fig. 6).

Among the floristic elements, the most numerous are Eurasian (23.19%), followed by European (14.5%). Mediterranean species (10.15%), Paleotemperate and Eurosiberian species (13.05%) are found with remarkable frequencies (Fig. 7).

As a result of the soft climate and the preservative character of this association the diploid species number (55.89%) is more increased than the polyploides one (44.12%), (Fig. 8).

NATURA 2000: 40A0*

HdR: 3122

Table 2: *Pruno spinosae-Crataegetum* Soó (1927) 193

Relevee	1	2	3	4	5	6	7	
Altitude (m s.m.)	400	420	450	400	450	450	450	
Aspect	–	–	SV	SV	V	V	SV	
Inclination (°)	–	–	10	25	20	10	25	
Area (m ²)	100	100	100	100	100	100	100	
Vegetation coverage (%)	80	70	65	60	50	70	70	
								K
Prunion spinosae (incl. Prunetalia)								
<i>Prunus spinosa</i>	4	3	2	3	2	3	2	V
<i>Crataegus monogyna</i>	+	2	3	1	2	2	1	V
<i>Clematis vitalba</i>	+	+	–	+	–	+	+	IV
<i>Rosa canina</i>	–	+	+	–	+	+	+	IV
<i>Ligustrum vulgare</i>	–	–	–	–	+	+	+	III
<i>Frangula alnus</i>	–	–	–	+	–	+	–	II
Quercio-Fagetea								
<i>Pyrus pyraeaster</i>	–	+	–	–	+	–	+	III
<i>Quercus robur</i>	+	–	+	–	–	+	–	III
<i>Astragalus gycyphyllos</i>	–	–	–	–	+	–	+	II
Quercetea pubescenti-petraeae								
<i>Lembotropis nigricans</i>	–	–	–	+	+	+	–	III
<i>Peucedanum cervaria</i>	–	–	–	+	–	+	+	III

<i>Teucrium chamaedrys</i>	—	—	—	+	—	+	+	III
<i>Asparagus officinalis</i>	—	—	—	+	—	—	+	II
Origanetalia								
<i>Galium verum</i>	+	—	+	—	—	+	—	III
<i>Clinopodium vulgare</i>	—	—	—	—	+	—	+	II
<i>Euphorbia salicifolia</i>	—	—	—	+	+	—	—	II
<i>Hypericum perforatum</i>	—	+	—	—	+	—	—	II
Geranion sanguinei								
<i>Centaurea apiculata ssp.spinulosa</i>	+	—	—	+	+	—	+	III
<i>Vincetoxicum hirundinaria</i>	—	—	+	—	—	+	+	III
<i>Bupleurum falcatum</i>	—	—	+	—	+	—	—	II
<i>Stachys recta</i>	—	—	—	+	+	—	—	II
Convolvuletalia sepium								
<i>Rubus caesius</i>	—	+	+	—	+	—	+	III
<i>Cruciata laevipes</i>	+	+	+	—	—	—	—	III
Festuco-Brometea								
<i>Knautia arvensis</i>	+	+	+	—	+	+	+	V
<i>Leucanthemum vulgare</i>	+	+	+	+	+	+	+	V
<i>Veronica spicata ssp.orchidea</i>	+	+	—	+	+	+	+	V
<i>Agrimonia eupatoria</i>	+	+	—	+	—	—	+	IV
<i>Scabiosa ochroleuca</i>	—	+	—	+	+	+	+	IV
<i>Anthoxantum odoratum</i>	—	—	+	+	—	+	—	III
<i>Brachypodium pinnatum</i>	—	+	—	+	—	—	+	III
<i>Campanula sibirica</i>	—	+	+	—	—	+	—	III
<i>Dorycnium pentaphyllum ssp.herbaceum</i>	+	—	—	+	—	+	—	III
<i>Filipendula vulgaris</i>	—	+	—	—	—	+	+	III
<i>Salvia nemorosa</i>	+	—	—	—	+	—	+	III
<i>Asperula cynanchia</i>	—	—	—	+	—	+	—	II
<i>Inula ensifolia</i>	—	+	—	+	—	—	—	II
<i>Linum flavum</i>	—	—	—	+	—	—	+	II
<i>Linum perenne</i>	—	—	—	+	—	—	+	II
<i>Medicago falcata</i>	—	+	—	+	—	—	—	II
<i>Salvia pratensis</i>	—	—	—	+	—	+	—	II
<i>Salvia verticillata</i>	+	—	—	+	—	—	—	II
<i>Stachys germanica</i>	+	—	—	—	—	—	+	II
<i>Eryngium campestre</i>	—	+	—	—	—	—	—	I
<i>Euphorbia cyparissias</i>	+	—	—	—	—	—	—	I
Arrhenatheretalia (incl.Molinio-Arrhenaterethea)								
<i>Achillea millefolium</i>	+	+	+	+	+	+	+	V
<i>Prunella vulgaris</i>	+	+	+	+	+	+	+	V
<i>Agrostis capillaris</i>	—	+	+	—	+	+	—	III
<i>Ononis arvensis</i>	+	+	—	—	+	—	—	III
<i>Primula veris</i>	—	+	+	—	—	+	—	III
<i>Ranunculus acris</i>	+	+	—	—	—	—	+	III
<i>Centaurea nigrescens</i>	+	—	—	—	+	—	—	II
<i>Senecio jacobea</i>	+	—	—	+	—	—	—	II
<i>Stachys officinalis</i>	+	—	—	+	—	—	—	II

Variae syntaxa								
<i>Anthriscus sylvestris</i>	—	+	—	+	—	—	+	III
<i>Cuscuta europaea</i>	+	—	+	—	—	—	+	III
<i>Dipsacus laciniatus</i>	+	—	+	—	—	—	+	III
<i>Carduus hamulosus</i>	—	—	—	+	+	—	+	III
<i>Stellaria nemorum</i>	—	+	+	—	+	+	—	III
<i>Thalictrum aquilegifolium</i>	—	+	—	+	+	—	—	III
<i>Danthonia alpina</i>	—	—	—	+	+	—	—	II
<i>Epilobium angustifolium</i>	—	+	—	+	—	—	—	II
<i>Epilobium parviflorum</i>	—	—	—	—	+	—	+	II
<i>Galium album</i>	—	+	—	+	—	—	—	II
<i>Potentilla recta</i>	+	—	+	—	—	—	—	II
<i>Robinia pseudacacia</i>	+	+	—	—	—	+	—	II
<i>Sambucus ebulus</i>	+	—	—	—	+	—	—	II
<i>Verbena officinalis</i>	+	+	—	—	—	—	—	II
<i>Malva sylvestris</i>	—	—	—	+	—	—	—	I
<i>Xanthium spinosum</i>	—	+	—	—	—	—	—	I

Place and date of releves: R1–3 Morești 13.07.2009, R4–7 Morești 08.08.2010

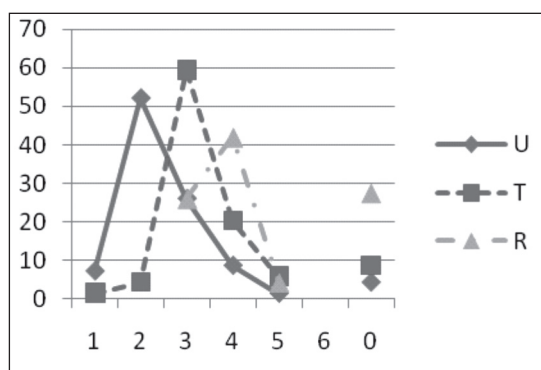


Fig. 5: Ecological indices of *Pruno spinosae-Crataegetum* association

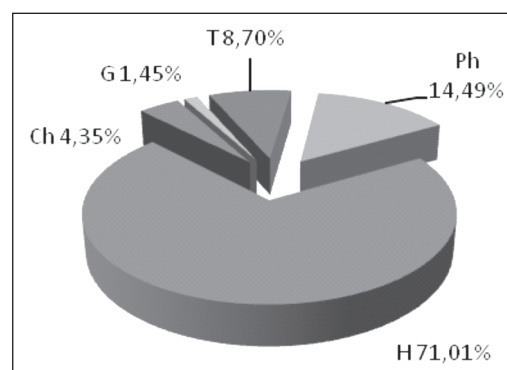


Fig. 6: Bioforms spectrum of *Pruno spinosae-Crataegetum* association

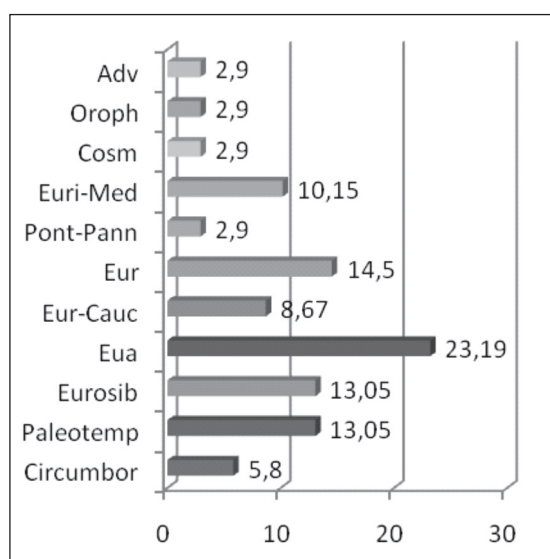


Fig. 7: Floristical elements of *Pruno spinosae-Crataegetum* association

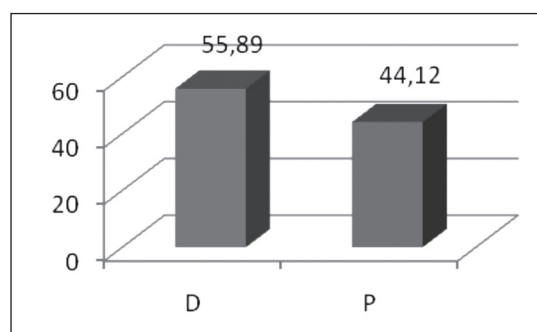


Fig. 8: Caryological spectrum of *Pruno spinosae-Crataegetum* association

***Prunetum tenellae* Soó 1947**

The phytocoenoses of this association are located at the edge of the forest in silvosteppe and sunny slopes. In the studied area, dwarf Russian almond shrubs occupy the upper third of slopes with south and south-west exposure, intercalate with xerophylic and xeromesophylic meadows of Festuco-Brometea class. The characteristic species of *Prunetalia* order and of *Prunion fruticosae* alliance found in the studied phytocoenoses are: *Crataegus monogyna*, *Prunus tenella*, *Pyrus pyraster*, *Rosa canina*, *Rosa gallica*. The greatest number of species belongs to the Festuco-Brometea class (Table 3) that gives the characteristic xerophylic feature of these associations.

Analyzing the phytocoenoses of this association in terms of ecological preferences, a predominance of xero-mesophilous (63.24%) and xerophilous species (11.77%) is noticeable. Depending on temperature requirements, the most numerous species are micro-mesothermal (52.95%) and eurythermal (10.36%). Regarding the soil reaction, low acid-neutrophilous species record the highest frequencies (57.36%), followed by euryionic species (17.65%), (Fig. 9).

In the bioform spectrum (Fig. 10), in addition to the predominant hemicryptophytes (63.24%), terophytes (11.76%), and camephytes (10.29%) can also be found with significant frequencies.

In the area and geographical structure of the association there are variable proportions of ten categories from the phytogeographically differently derived components. An Eurasian basis distinguishes itself (29.41%) over which Eurosiberian, European and Mediterranean species (13.23% each) have overlapped, the other types of floristic elements having a lower participation (Fig. 11).

The caryologic analysis reveals the predominance of diploid species (47.76%), followed by polyploid (44.77%), diplo-polyploid species having a share of 7.46% (Fig. 12).

NATURA 2000: 40A0*

CLAS. PAL.: 31.8B12p, 31.8B13, 31.8B14, 31.8B3p

Table 3: *Prunetum tenellae* Soó 1947

Relevee	1	2	3	4	5	6	7	
Altitude (m s.m.)	400	420	400	400	420	420	400	
Aspect	V	SV	V	S	SV	SV	SV	
Inclination	45	45	30	40	40	10	30	
Area (m ²)	100	100	100	100	100	100	100	
Vegetation coverage (%)	75	60	70	75	60	90	80	K
Prunion spinosae (incl.Prunetalia)								
<i>Prunus tenella</i>	4	3	4	3	3	4	4	V
<i>Crataegus monogyna</i>	+	+	+	+	–	+	–	IV
<i>Pyrus pyraster</i>	+	–	–	+	–	–	–	II
<i>Rosa canina</i>	–	–	–	–	–	+	+	II
<i>Rosa gallica</i>	–	–	–	+	+	–	–	II
Querc-Fagetea								
<i>Astragalus glycyphyllos</i>	+	+	+	–	+	–	–	III
Quercetea pubescenti-petraeae								
<i>Asparagus officinalis</i>	–	–	–	+	–	–	+	II
<i>Peucedanum cervaria</i>	–	–	+	–	–	+	–	II

Geranion sanguinei								
<i>Centaurea apiculata</i> ssp. <i>spinulosa</i>	–	–	–	+	–	+	–	II
<i>Stachys recta</i>	–	–	–	+	–	–	+	II
<i>Bupleurum falcatum</i>	–	–	–	+	–	–	–	I
Festucion rupicolae								
<i>Crambe tatarica</i>	+	+	–	+	–	–	–	III
<i>Falcaria vulgaris</i>	–	–	–	–	+	+	+	III
<i>Inula ensifolia</i>	–	–	–	+	–	+	–	II
<i>Knautia arvensis</i>	–	–	–	+	–	–	–	I
<i>Nonea pulla</i>	–	–	–	+	–	–	–	I
Festuco-Brometea								
<i>Teucrium montanum</i>	+	2	+	2	1	+	+	V
<i>Euphorbia cyparissias</i>	+	+	+	–	–	+	+	IV
<i>Fragaria viridis</i>	+	+	+	–	–	+	+	IV
<i>Thymus pulegioides</i>	+	+	+		+	–	+	IV
<i>Brachypodium pinnatum</i>	–	–	–	+	+	+	+	III
<i>Centaurea rhenana</i>	+	+	+	+	–	–	–	III
<i>Galium verum</i>	+	+	+	+	–	–	–	III
<i>Linum flavum</i>	–	–	–	–	+	+	+	III
<i>Medicago lupulina</i>	+	–	+	–	–	2	+	III
<i>Melampyrum cristatus</i>	–	–	–	+		+	+	III
<i>Muscari comosum</i>	+	–	+	–	–	+	+	III
<i>Plantago media</i>	+	–	+	–	–	+	–	III
<i>Salvia nemorosa</i>	+	–	+	–	–	+	–	III
<i>Salvia verticillata</i>	–	–	–	–	+	+	+	III
<i>Scabiosa ochroleuca</i>	–	–	–	+	–	+	+	III
<i>Veronica spicata</i> ssp. <i>orchidea</i>	–	–	–	+	+	+	+	III
<i>Agrimonia eupatoria</i>	–	–	–	+	+	–	–	II
<i>Aperula cynanchica</i>	–	–	–	+	+	–	–	II
<i>Astragalus austriacus</i>	–	–	–	+	–	+	–	II
<i>Astragalus onobrychys</i>	–	–	–	–	–	+	+	II
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	–	–	–	+	1	–	–	II
<i>Polygala major</i>	–	–	–	+	+	–	–	II
<i>Chamaecytisus albus</i>	–	–	–	–	+	–	–	I
<i>Echium vulgare</i>	–	–	–	–	+	–	–	I
<i>Galium album</i>	–	–	–	+	–	–	–	I
<i>Leucanthemum vulgare</i>	–	–	–	+	–	–	–	I
<i>Linum perenne</i>	–	–	–	–	–	–	+	I
<i>Onobrychis viciifolia</i>	–	–	–	+	–	–	–	I
<i>Salvia pratensis</i>	–	–	–	+	–	–	–	I
<i>Stacya germanica</i>	–	–	–	+	–	–	–	I
Arrhenatheretalia (incl. Molinio-Arrhenatheretia)								
<i>Achillea millefolium</i>	+	–	+	+	+	+	+	V
<i>Cichorium intybus</i>	–	–	–	–	–	+	+	II
<i>Ononis arvensis</i>	–	–	–	+	+	–	–	II
<i>Senecio jacobea</i>	–	–	–	+	+	–	–	II
<i>Dactylis glomerata</i>	–	–	–	+	–	–	–	I
<i>Eryngium planum</i>	+	–	–	+	–	–	–	I
<i>Holcus lanatus</i>	–	–	–	–	+	–	–	I

Molinieta								
<i>Thalictrum flavum</i>	+	–	+	–	+	–	–	III
<i>Agrostis stolonifera</i>	–	–	–	+	–	–	–	I
<i>Inula britannica</i>	–	–	–	–	+	–	–	I
Variae syntaxa								
<i>Coronilla varia</i>	+	+	–	+	–	–	–	III
<i>Potentilla erecta</i>	+	+	–	–	+	–	+	III
<i>Vinca minor</i>	+	+	+	–	–	–	–	III
<i>Allium ericetorum</i>	–	–	–	–	–	+	1	II
<i>Clinopodium vulgare</i>	–	–	–	–	–	+	+	II
<i>Danthonia alpina</i>	–	–	–	+	–	+	–	II
<i>Ornithogalum umbellatum</i>	–	–	–	+	+	–	–	II
<i>Stipa pulcherrima</i>	–	–	–	+	–	–	+	II
<i>Thalictrum aquilegifolium</i>	–	–	–	+	–	–	+	II
<i>Nigella arvensis</i>	–	–	–	–	+	–	–	I
<i>Salix alba</i>	–	–	–	+	–	–	–	I
<i>Tragopogon pratensis ssp.orientalis</i>	–	–	–	+	–	–	–	I

Place and date of relevee: R1–3 Morești 17.04.2010, R 4–5 Morești 06.06.2010, R6–7 Morești 08.08.2010

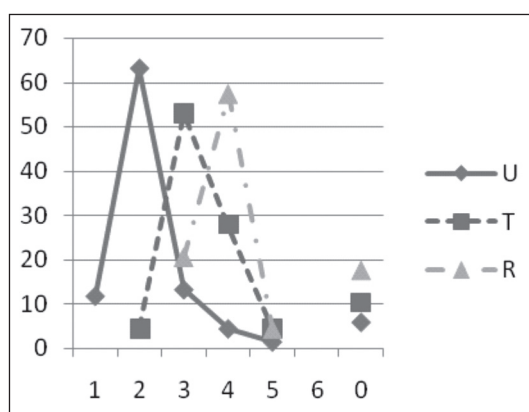


Fig. 9: Ecological indices of *Prunetum tenellae* association

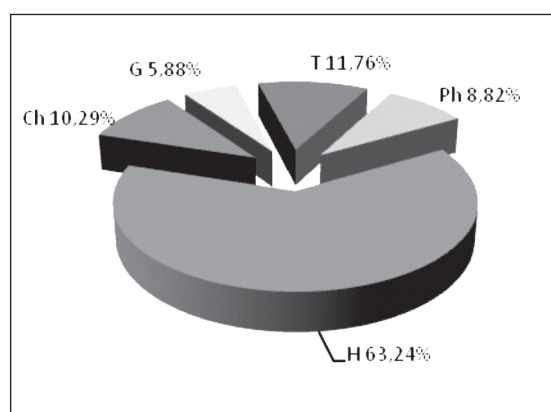


Fig. 10: Bioforms spectrum of *Prunetum tenellae* association

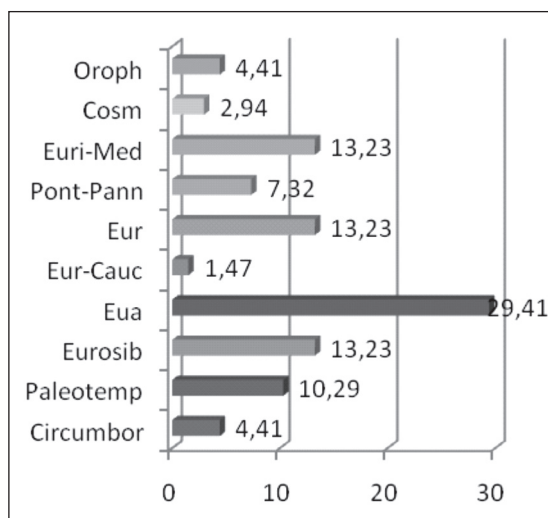


Fig. 11: Floristical elements of *Prunetum tenellae* association

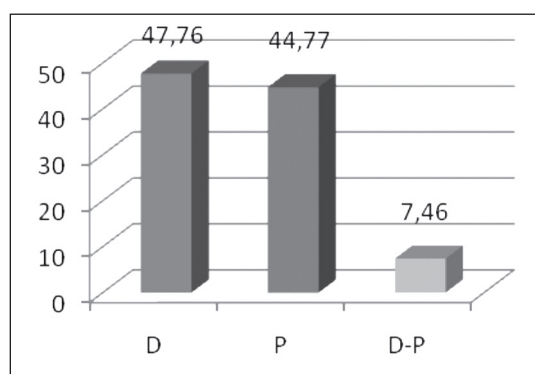


Fig. 12: Caryological spectrum of *Prunetum tenellae* association

Several threatened and rare taxa were identified within these shrubs flora. These taxa are included in the national red lists [5, 11]: *Crambe tatarica*, *Stipa pulcherrima*, *Prunus tenella*.

REFERENCES

1. Adler, W., Oswald, K., Fischer, R., 1994, *Excursionsflora von Österreich*, Verlag Eugen Ulmer, Stuttgart und Wien.
2. Barkman, J.J., Moravec, J., Rauschert, S., 1981, Code der pflanzensoziologischen Nomenklatur, *Vegetatio*, **67(3)**, Upsala: 145–195.
3. Borza, A., 1929, *Vegetația și flora Ardealului*, Schiță geobotanică, Atelierele grafice “Cultura Națională”, București.
4. Borza, A., 1931, *Botanic excursion through “The Câmpia”*. Guide de la sixième excursion phytogéographique internationale. Roumaine, Institutul de Literatură și Tipografie “Minerva” S.A., Cluj.
5. Boșcaiu, N., Coldea, G., Horeanu, C., 1994, Lista roșie a plantelor vasculare dispărute, periclitare, vulnerabile și rare din flora României, *Ocrot. Nat. și Med. Înconj.*, **38(1)**, București: 45–56.
6. Doniță, N., Ivan, D., Coldea, G., Sanda, V., Popescu, A., Chifu, T., Paucă-Comănescu, M., Mititelu, D., Boșcaiu, N., 1992, *Vegetația României*, Ed. Tehnică Agricolă, București.
7. Doniță, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriș Iovu, A., 2005, *Habitatele din România*, Ed. Tehnică Silvică, București.
8. Gafta, D., Mountford, O., 2008, *Manual de interpretare a habitatelor Natura 2000 din România*, Ed. Risoprint, Cluj-Napoca.
9. Mucina, L., Grabherr, G., Ellmauer, T., 1993, *Die pflanzengesellschaften Österreich, Teil I*, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
10. Mucina, L., Grabherr, G., Wallnöfer, Susanne, 1993, *Die pflanzengesellschaften Österreich, Teil III*, VEB Gustav Fischer Verlag Jena, Stuttgart, New York.
11. Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V., Mihăilescu, Simona, 1994, Lista roșie a plantelor superioare din România, *Studii, sinteze, documentații de ecologie*, **1**, Acad. Română, Instit. de Biologie, București: 5–52.
12. Oroian, S., 1983, Cercetări fitotaxonomice pe dealul Corhan-Săbed, județul Mureș și posibilități de valorificare a florei, *Marisia*, **XI–XII (1)**, Târgu-Mureș: 47–74.
13. Oroian, Silvia, 1991, Aspecte din flora și vegetația pădurii Săbed (jud. Mureș), *Ocrot. Nat. și Med. Înconj.*, **35(1–2)**, București: 35–41.
14. Oroian, S., 2009, *Flora și vegetația satelor săsești din sud-estul Transilvaniei*, Ed. University Press, Târgu-Mureș.
15. Pop, I. et. al., 2002, Vegetația județului Cluj (Studiu fitocenologic, ecologic, bioeconomic și eco-protectiv), *Contribuții Botanice*, Cluj-Napoca: 5–254.
16. Sanda, V., Popescu, A., Stancu, Daniela Ileana, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*, Ed. Conphis, Pitești.
17. Sârbu, A.(coord.), 2003, *Ghid pentru identificarea importantelor arii de protecție și conservare a plantelor din România*, Ed. alo București!, București.
18. Tutin, T. G., 1991, *Flora Europaea*, **I**, Ed. II, Cambridge University Press.
19. Tutin, T. G. et. al. (eds.), 1964–1980, *Flora Europaea*, **1–5**, Cambridge University Press.

VEGETAȚIA ARBUSTIVĂ DIN JURUL LOCALITĂȚII MOREȘTI (JUDEȚUL MUREȘ) (Rezumat)

Această lucrare descrie vegetația arbustivă din împrejurimile localității Morești (județul Mureș). Fitocenozele au fost identificate pe versanții însoriți din vecinătatea localității Morești, pe malul drept al râului Mureș, în aval de municipiul Târgu-Mureș.

Fitocenozele studiate au fost încadrate în clasele Galio-Urticetea și Rhamno-Prunetea. Au fost identificate trei asociații vegetale: *Sambucetum ebuli* Felföldy 1942, *Pruno spinosae-Crataegum* Soó (1927) 1931 și *Prunetum tenellae* Soó 1947.

Au fost, de asemenea, identificați o serie de taxoni aflați în diverse stadii de periclitare, incluși în listele roșii naționale.

ZOOLOGY

ENTOMOFAUNA AS COMPONENT OF FOREST ECOSYSTEMS IN REPUBLIC OF MOLDOVA

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Abstract: This paper includes the analysis of species diversity and importance of some invertebrates (Collembola, Homoptera and Coleoptera) for the forest ecosystems. At the present time in the Republic of Moldova there can be found 350 species of Homoptera (aphids). Among them – 145 produced “honey dew” for 31 species of ants. They represented source of food for several species of insects. There are some species of aphids that are pests of agricultural plants, but they are not dangerous for the forests. Coleopterans have been studied in the landscape reserve “Codrii Tigheciului” (160 species) and in other forests (20 edaphic and dendrophylous species) collected in the central area and northern zones of the Republic of Moldova. After the trophic spectrum the recorded phytophagous coleopterans aren't dangerous for forest ecosystems, although in drought years the dendrophylous species *Galerucella luteola* was very abundant in elm forest. In forest ecosystems were registered various trophic groups of coleopterans: predatory, necrophagous, coprophagous and saprophagous, which have a positive role in the maintenance of sanitary status of woods. An important role for forest ecosystems is also represented by the colembolans that decompose the organic matter and participate to the formation of the humus and soil structure. Collembolan fauna was analyzed on the basis of material collected in the State Nature Reserve “Plaiul Fagului”, where 118 species were recorded, which constitute more than half of total number of collembolan species registered for the Republic of Moldova.

Keywords: forest ecosystems, Collembola, Homoptera, Coleoptera, species diversity, Republic of Moldova

Introduction

The forest is a natural complex in community of which dominate several species of trees, shrubs and herbaceous plants. Many animal species inhabit the forest ecosystems, including invertebrates. One of the main problems in forest study is the knowledge and conservation of biodiversity. Typically, natural forests are characterized by a relatively stable equilibrium. In Moldova, forest ecosystems have suffered drastic modifications because of human intervention, which led to pest outbreaks appearance and as result changed their biodiversity. To regulate the number of forest pests it is necessary to know not only dendrophylous insects, but also the whole complex of insects.

In scientific literature on forest entomology, including specialized academic books are usually included only insects living on trees and shrubs and particularly the pest species and their entomophags, which creates a false and incomplete impression about the role of insects in forest ecosystems. Such data are included in manuals for university forestry, for example: Forest entomology (Voronțov, 1975), Biological basis of forest protection (Vorontsov, 1963, 1975); Biogeocenological study of phytophagous forest insects (Rafes, 1980). In the last book there is no data on phytophagous insects of herbaceous plants in forests. However, among the great diversity of dendrophylous insects, the pests, including the potential ones, represent a very small percentage; the other species are only one component of forest ecosystems that maintain their ecological balance.

Material and methods

The material discussed in the paper was collected during many years of scientific research (1960–2010), within various forest ecosystems of the Republic of Moldova. In order to obtain rich faunistic material different entomological methods of collection, preservations, treatment, preparation of museum collection were used for the studied groups (Collembola, Homoptera, Coleoptera), with the specific procedures for each group of invertebrates.

Results and discussions

A result of accomplished studies in forest zones of the Republic of Moldova invertebrates from 3 orders were collected and identified (Collembola, Homoptera and Coleoptera).

Order Homoptera (order to which belong the aphids) is a very important group of insects, widespread and very diverse. In deciduous forests of the Republic of Moldova there are no harmful aphids species. Aphids are only one of the components of the food chain. In total, according to data accumulated over many years of research, on the territory of Republic of Moldova 350 species of aphids are known at present, including 190 species that develop on 209 species of herbaceous plants, which occur mainly in forests and their outskirts, of which 156 are perennial plant. Aphids are numerous, varied and quite widespread, are an important component of forest entomofauna serving in general as food source for many other groups of insects.

The flora of Moldova includes 2000 species of vascular plants [8], but currently the natural vegetal cover has only been preserved on an area of approximately 10% of the country territory [6, 7]. The most rare and vulnerable species of flora are included in the Red Book of Moldova [4], second edition, where 117 plant species are cited. We have to mention that without considering the human impact on ecosystems, due to the diversity of habitats, the diversity of flora and climatic features; in Moldova can be meet approximately 12,000 species of insects, of which about 1,400 species are dendrophylous.

Among insects as rare species are included 37 species of eight orders of insects. Aphids are not included in this list, but among them are already identified 32 rare species whose host plants are not only rare, but also common species. All the aphids are phytophagous. The biocenologic role of aphids in the regional fauna is characterized by a variety of functions; they are not only consumers in the first degree. The sweet excrements eliminated by aphids after their biochemical qualities represent valuable natural food for many parasite species and entomophagous predators of the orders Hymenoptera and Diptera (especially Syrphidae and Tachinidae). In Moldova there are 145 species of aphids that produce sweet excrements (honey dew), which is a trophic resource exploited by 31 species of ants.

Along with harmful aphids there are also many aphid species that aren't harmful and serve as hosts for aphidophagous species. In our forests can be met many non-harmful aphid species with increased density and widely spread on many plants (on *Artemisia* sp. – aphid species: *Macrosiphoniella absinthii* (L.), *M. artemisiae* (B. d. F.), on *Cichorium intybus* L. – *Aphis intybi* Koeh, on *Salvia* sp. – *Aphis salviae* Walk., on *Tanacetum vulgare* L. – *Metopeurum fuscoviride* Stroy, on *Tragopogon* sp. – *Brachycaudus tragopogonis* (Kalt.).

As conclusions, the aphids influence upon the structure of entomofauna and the regional aphidofauna must be preserved as component of the whole forest entomofauna.

Among the biggest, most colored and important for forest ecosystems are the insects from order Coleoptera. As result of studies accomplished in landscape reserve „Codrii Tigheci” (2003 – 2007), there were registered 160 species of edaphic coleopterans from 75 genera and 8 families (Carabidae, Silphidae, Staphylinidae, Scarabaeidae, Geotrupidae, Trogidae, Lucanidae, Tenebrionidae). Also, researches on edaphic coleopterans from central and northern zones of the republic were performed [1]. As result another 20 coleopteran species were identified typical for forest ecosystems.

Coleopterans have the role of nature sanitars, by maintaining the circuit of energy and matter. Among them there are necrophagous, coprophagous and saprophagous species. Coleopterans from genera *Trox*, *Nicrophorus*, *Silpha* etc. are necrophagous and contribute to the decomposing of corpses, some species from genera *Onthophagus*, *Aphodius*, *Philonthus*, *Atheta*, *Aleochara* etc. participate at decomposing of manures. Very important for the circuit of energy and matter in nature are the xylophagous insects, which intensify the process of dead wood dcomposing. Among xylophagous insects can be mentioned the species of family Cerambycidae: *Rhagium sycophanta* (Schr), *Prionus coriarius* (L.), but also many other smaller species from the family Staphylinidae: *Habrocerus capillaricornis* (Grav), *Sepedophilus immaculatus* (Steph), *S. marshami* (Steph), *S. obtusus* Luze. In order to maintain the number of pest insects the predatory coleopterans have a significant role, they use for food eggs, larvae and small insects. The carabids and staphilinids have a high species diversity and at the same time have an important role in the structure and functioning of forest ecosystems. Being agile predators, they use for food various invertebrates – nematodes, acarians, collembolans for smaller species, larvae and adults of coleopterans, as well as other insects and also mollusks for the larger species. In forest ecosystems inhabit many phytophagous species, but harmful for the forestry are only few of them, among which the species *Lytta vesicatoria* (L.) and *Galerucella luteola* (Müll.) are.

Another abundant group of forest soil, with a high species and trophic diversity is the order Collembola. The collembolans are a group of pedobiont invertebrates, which play a key role in the processes of humification and recycling of matter and energy in nature. Being mostly destructors of second degree, they decompose all types of plant and animal remains, excrements of other creatures, participate actively in the processes of humus and soil structure formation. Being closely related to soil the collembolans react rapidly to any changes in their living environment and are used in recent years as indicators of ecological status of ecosystems.

The widest variety of species, the largest number of individuals is formed by the complexes of collembolans from protected forest areas. Here the anthropogenic influence is minimal, the vegetation layer is abundant and the litter is present in advanced state of decomposition. In such areas collembolan species number and density reach peak values in autumn months up to 40,000 individuals/m².

To justify the above mentioned we present the results of multiannual study of collembolans from the State Natural Reserve „Plaiul Fagului”. Between the years 2004 – 2010 studies in State Natural Reserve „Plaiul Fagului” were accomplished, where soil, litter, moss, decayed wood

samples were collected, and multi-seasonal dynamics of collembolans was studied. To highlight a wider range of species moss samples were collected on decomposed logs, soil on the banks of ponds, from wetlands and meadows and hydrophilous species on the water surface and aquatic vegetation [2, 3, 5].

As result of performed research in the State Natural Reserve „Plaiul Fagului” 118 species of collembolans were recorded belonging to 57 genera and 17 families, which constitute more than half of the total number of species identified in the Republic of Moldova. Among these species of greatest interest are the rare ones from the genera *Karlstejnina*, *Deutonura* and *Vertagopus*. Approximately 70% of the total number of species identified in the reserve can be met in sapro-ilicolous and saprolignicolous microhabitats. The most densely populated are the mosses and decaying logs. For some species the decomposed wood or wet sector are the only inhabiting place, while others are found only in the area of contact between soil and decayed wood.

The results of studies accomplished on the three invertebrate groups emphasize the abundance of species present in forest ecosystems and their importance for biodiversity conservation.

Conclusions

The forest is a natural ecosystem that includes the flora, fauna and soil together with an entire complex of invertebrates, of which importance is major and varied for the natural balance. To know and maintain the forest entomofauna is important to see the forest as a complex and functional biocenosis. The dendrophilous insects constitute only a small part among the diversity of forest species, the density of which is regulated by entomophagous species and don't need special control measures.

The invertebrates represent an important link of the trophic chain within the forest ecosystems and at the same time have an essential role in the processes of humification and recycling of matter and energy in nature.

REFERENCES

1. Bacal, S., Bușmachi, G., Calestru, L., 2010, Taxonomic composition of insects (*Collembola*, *Coleoptera: Carabidae*, *Silphidae*, *Staphylinidae* and *Chrysomelidae*) from the forest ecosystems of the Republic of Moldova. *România, Bârlad. Muzeul "Vasile Pârvan". Acta musei tutovensis*, **IV**, 267–275.
2. Bușmachi, G., 2007, Seasonal fluctuation and some aspects of *Collembola* distribution from the "Plaiul Fagului" Natural Forest Reserve. *Muzeul Olteniei Craiova. Studii și comunicări. Științele naturii*, **V. 23**, 77–80.
3. Bușmachi, G., 2008, *Collembola* (Insecta) from the "Plaiul Fagului" State Nature Reserve. *Romania, Oltenia. Studii și comunicări. Științele naturii*, **Vol. XXIV**, 57–60.
4. *Cartea Roșie a Republicii Moldova*. Chișinău: Știința 2001, 287.
5. Doniță, N., Ursu, A., Cuza, P., Ticu, L., Bușmachi, G., Ostafciuc, V., 2007, *Cercetarea ecosistemelor forestiere din rezervatia "Plaiul Fagului"*, Ed. Universul, Chișinău: 1–176.
6. Postolache, Gh., 1995, *Vegetația Republicii Moldova*. Chișinău: 340.
7. *Strategia națională și Planul de acțiune în domeniul conservării diversității biologice*, 2002, Chișinău: Știința, 104.
8. Gejdeman, T., 1966, *Rastitelinyj pokrov Moldavskoj SSR*, Kișinev, 46.
9. Voronțov, A. U., 1975, *Lesnââ entomologîâ*. Moscva: Vyssââ școla, 368.
10. Voronțov, A. U., 1963, *Biologičeskie osnovy zašity lesa. Učebnoe posobie*. Moscva: Vyssââ școla, 303.
11. Rafes, P. M., 1980, *Biogeoecenologičeskie issledovaniâ rastitelinoâdnyh lesnyh nasekomyh*. Moscva: Nauka, 168.

**ENTOMOFAUNA CA ȘI COMPONENT AL ECOSISTEMELOR FORESTIERE
DIN REPUBLICA MOLDOVA
(Rezumat)**

Una din componentele de bază ale ecosistemelor forestiere o constituie entomofauna. În lucrarea de față au fost analizate nevertebrate ce aparțin ordinilor: Collembola, Homoptera (afidele) și Coleoptera. În Republica Moldova se cunosc, până în prezent, 350 specii de afide. Din numărul total de specii, 145 produc „roua de miere” pentru 31 specii de furnici. Afidele servesc în general ca sursă de hrană pentru multe alte grupe de insecte. Există și unele specii de afide dăunătoare culturilor agricole, dar pentru ecosistemele forestiere ele nu prezintă nici un pericol. Coleopterele au fost analizate în baza materialului colectat din cadrul rezervației peisagistice „Codrii Tigheciului” (160 specii), dar și a altor coleoptere forestiere (20 specii) edafice și dendrofile, colectate din zonele de centru și nord a Republicii Moldova. Conform spectrului trofic, coleoptere fitofage periculoase pentru ecosistemele silvice practic nu există, totuși în anii secetoși a fost semnalată din abundență, în pădurea de ulm, specia dendrofilă *Galerucella luteola*. Folositoare pentru ecosistemele forestiere sunt considerate speciile prădătoare, care contribuie la diminuarea efectivelor insectelor dăunătoare; de asemenea un rol pozitiv îl au și speciile sanitare (necrofage, coprofage și saprofage), care participă la descompunerea cadavrelor, dejecțiilor și a materiei vegetale moarte, repunând materia organică în circuit. Un rol important pentru ecosistemele forestiere îl dețin și colembotele; ele reprezintă destructori de gradul II, descompun materia vegetală și animală și participă activ la formarea humusului și a structurii solului. Fauna de colembote a fost analizată pe baza materialului colectat din cadrul Rezervației Naturale de Stat „Plaiul Fagului”; s-au înregistrat 118 specii, ceea ce constituie mai mult de jumătate din numărul total de colembote cunoscute în Republica Moldova.

FAUNISTIC AND ECOLOGICAL RESEARCH ON THE CHRYSOMELIDAE (COLEOPTERA) FAMILY IN THE UPPER BASIN OF THE MUREȘ RIVER WITH SPECIAL REFERENCE TO THE REPRESENTATION OF THE CHRYSOMELID SUBFAMILIES WITHIN THE RESEARCHED HABITATS

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Abstract: Research conducted in the upper basin of the Mureș River during the years 2005–2009 from May to September, revealed a total of 227 chrysomelid species out of 48 genera belonging to 10 subfamilies. Research has been made 15 representative habitat types differentiated by altitude and biocoenosis structure. The best represented subfamilies are the Halticinae with 104 species of 17 genera, the Chrysomelinae with 52 species of 15 genera, followed by the Chryptocephalinae with 27 species of two genera, the Cassidinae with 15 species of a single genus, the Clytrinae and Galerucinae with 11 species of 4 genera, the Criocerinae with 4 species of 2 genera, respectively the Donaciinae, Zeugophorinae, Lamprosomatinae with one species each. The most stable populations according to the ecological diversity and equitability indexes are the mesophilic grassland habitats, the riverside coppices and the deciduous forests.

Keywords: upper basin of the Mureș River, chrysomelids.

Introduction

Chrysomelids, through the large number of known species and the specific adaptation they manifest, may be considered as a family of insects in full evolutionary expansion, presenting a highly advanced variability with a highly emphasized population dynamics. The majority are terrestrial species, but there are also semi-aquatic and aquatic forms among them (*Donacia*, *Haemonia*). Currently, the number of species is estimated to 35,000, belonging to 15 subfamilies. Being exclusively phytophagous they can become extremely dangerous pests in the agricultural crops and the forest flora.

Transylvanian faunal data were drawn up by many renowned authors [1, 2, 3, 4, 5, 6, 7, 9, 11]. The present work encompasses the period of research from 2005 to 2009 in the upper basin of the Mureș River, summarizing the number of Chrysomelid species captured on subfamilies within the researched habitats.

Materials and methods

Collections were made by sweeping the herbaceous vegetation with an entomological net, respectively with an entomological umbrella by swaying the trees in various habitats

such as forests, pastures, meadows, underwoods, low-density forests, riverside coppice, ruderal vegetation. The material collected was killed in 70% alcohol, kept dry in glass tubes. Measurements were made in the laboratory by the binocular magnifier relying on the specialized works developed by the authors mentioned in the references [8.10]. The research area includes the Vălenii de Mureș Depression (Islands of the Mureș River, Vătava) the Toplița – Deda pass (Gurghiului, Călimani Mountains), the Gheorgheni Depression (Mureș River valley, Voșlobenilor Mountains, Gurghiu Mountains, Giurgeului Mountains), Nature Reserves, protected areas (Călimani National Park, the Mociar Forest, the Nyeres swamp, meadow with daffodils from Gurghiu, the resonance spruce forest in Lăpușna, massive Royal Throne, the motleyed tulip reserve in Vălenii de Mureș).

The research stations comprise various types of forest habitats (spruce forests, beech forests, coniferous forests with beech, deciduous forests) and grassland type (mesophilic meadows, mesohygrophilous meadows, mesoxerophilous meadows, pastures, glades, low-density forests, riverside coppice, marshes, ruderal vegetation, underwoods, artificial landscapes) with a range of altitudes in between 365–1281 m (Fig. 1, 2).

Results and discussion

Research conducted in the upper basin of the Mureș River, during the years 2005–2009 from May to September at 55 collection stations. We found a total of 227 Chrysomelid species belonging to 48 subfamilies (Table 1).

The best represented subfamilies are the Halticinae with 104 species in 17 genera, the Chrysomelinae with 52 species of 15 genera, followed by the Chryptocephalinae with 27 species of 2 genera, the Cassidinae with 15 species of a single genus, Galerucinae with 11 and Clytrinae with 11 species out of 4 genera, the Criocerinae with 4 species and 2 genera, respectively the Donaciinae, Zeugophorinae, Lamprosomatinae with one species each.

Table 1: Distribution of captured chrysomelid species according to genus and subfamilies

no.	Subfamily	No. of species	No. of genera
1	Halticinae	104	17
2	Chrysomelinae	52	15
3	Chryptocephalinae	27	2
4	Cassidinae	15	1
5	Galerucinae	11	4
6	Clytrinae	11	4
7	Criocerinae	4	2
8	Donaciinae	1	1
9	Zeugophorinae	1	1
10	Lamprosomatinae	1	1
	Total	227	48

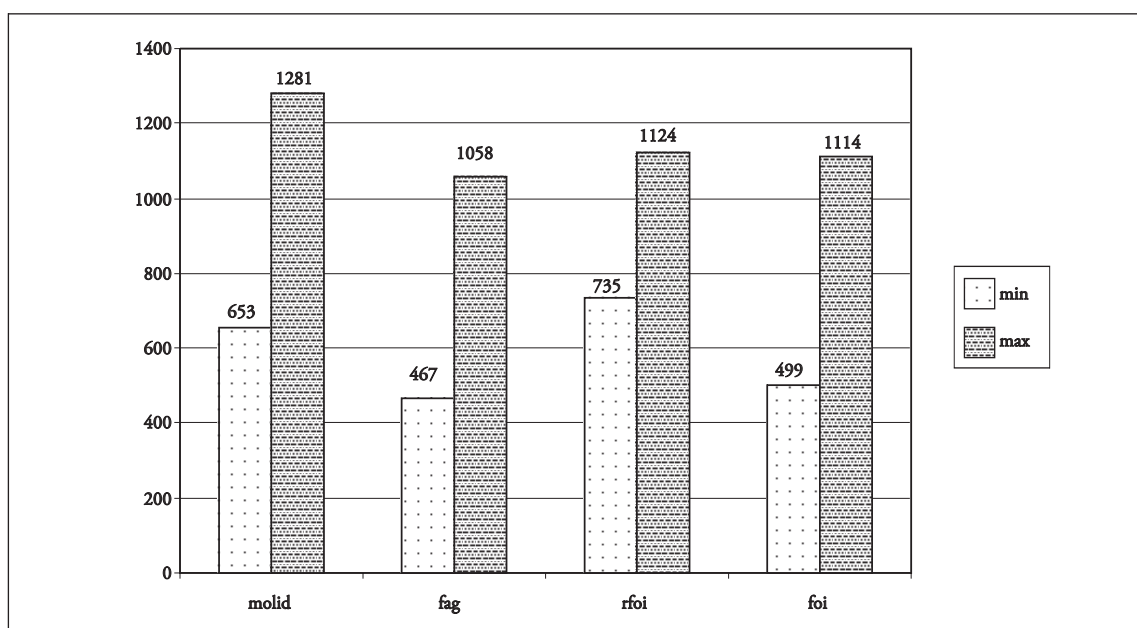


Fig. 1: Distribution of forest habitats according to altitudes
(molid – spruce fire, fag – beech, rfoi – coniferous and deciduous forests, foi – deciduous forests)

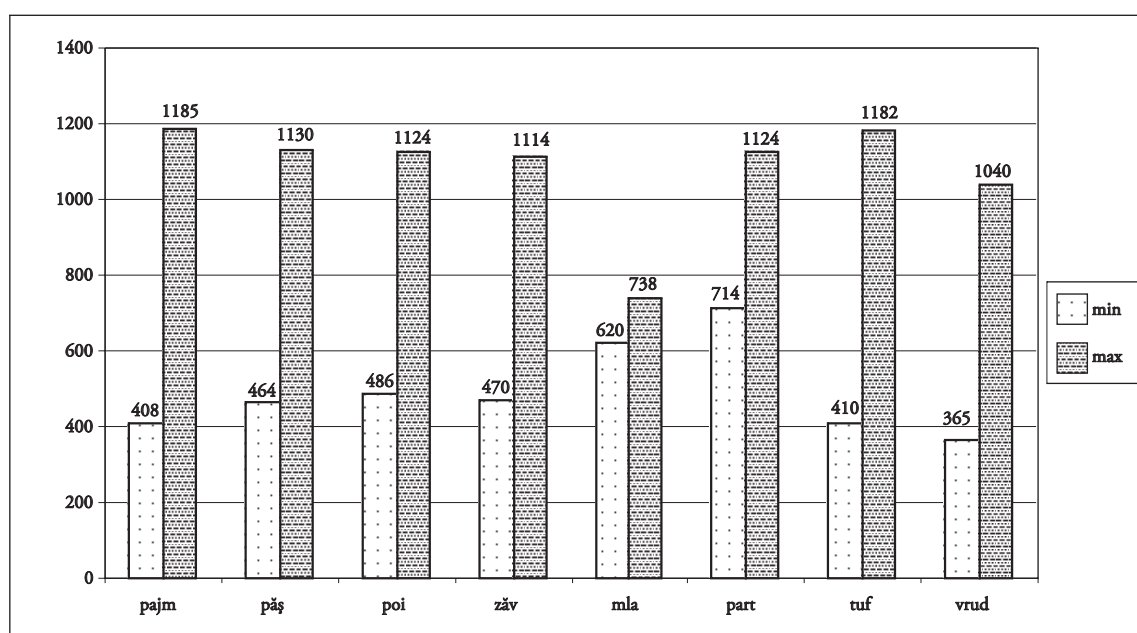


Fig. 2: Distribution of grassland habitats according to altitudes
(pajm – mesophilic meadows, păș – pasture, poi – glade, zăv – riverside coppice, mla – swamp, part-artificial meadows, tuf – underwoods, vrud – ruderal vegetation)

The number of species and individuals on subfamilies of the chrysomelid population present an emphasized variability depending on the habitat. Thus, the most representative forest habitats in terms of the collected chrysomelid population are the deciduous forests with 1168 individuals belonging to 59 species, followed by mixed coniferous and deciduous forests with 488 individuals and 31 species, the beech forests with 238 individuals and 27 species, the spruce forests with 153 individuals and 23 species (Fig. 3).

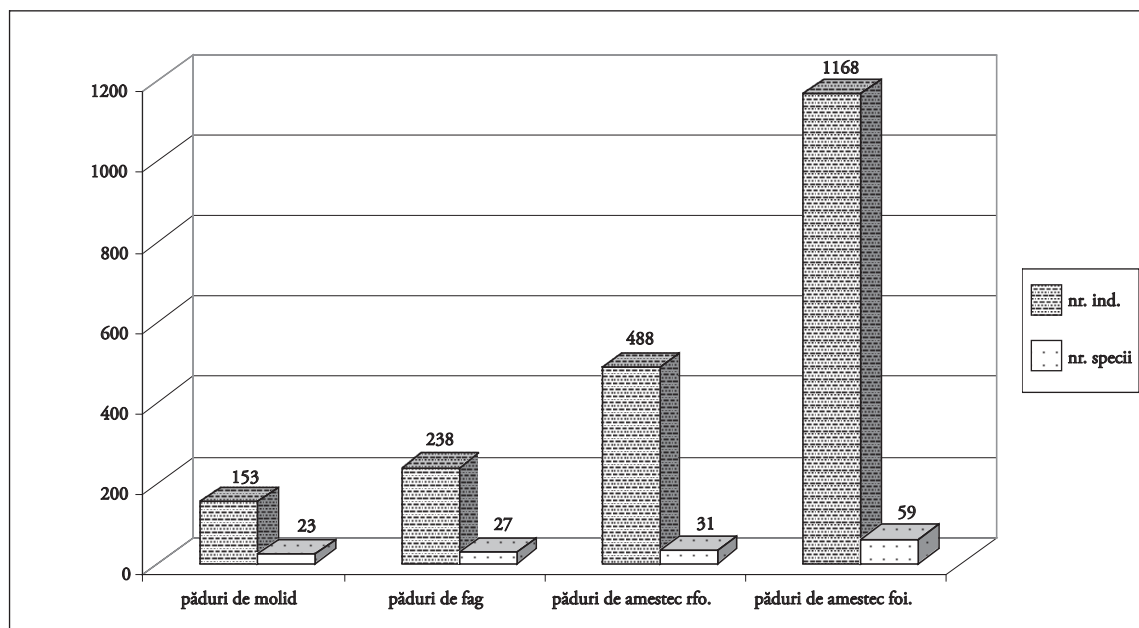


Fig. 3. Distribution of the chrysomelide population from the forest habitat
(păduri de molid – spruce fir forests, păduri de fag – beech forests, rfo – coniferous and deciduous forests, foi – deciduous forests, nr. specii – species number, nr. ind. – number of specimens)

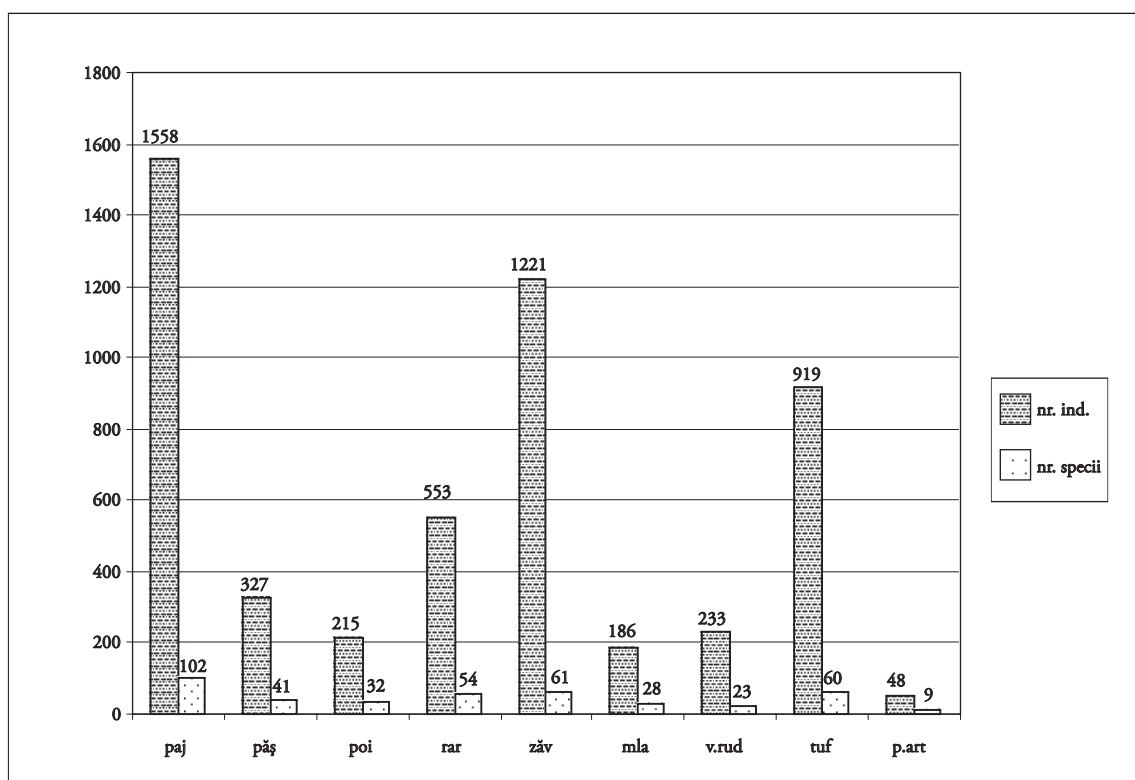


Fig. 4. Distribution of the chrysomelid populations in the grassland habitats
(paj – mesophilic meadows, păș – pasture, poi – glade, zăv – riverside coppice, mla – marshes, p.art – artificial meadows, tuf – underwoods, v.rud – ruderal vegetation, nr. specii – species number)

Among the most representative grassland habitats of the chrysomelid populations are the mesophilic meadows with 1558 individuals and 102 species followed by the riverside coppices

with 1221 individuals and 61 species, the underwoods with 919 individuals and 60 species, the low-density forests with 553 individuals and 54 species, the pastures with 327 individuals and 41 species, the ruderal vegetation with 233 individuals and 23 species, the glades with 215 individuals and 32 species, the swamps with 186 individuals and 32 species, respectively artificial landscapes with 48 individuals and 9 species (Fig. 4).

The analysis on the distribution of species in forests and herbaceous habitats shows that the vegetation layer of the natural ecosystems ensures the development of chrysomelids through the presence of host plants.

One may find that most specimens were collected from grass flora (mesophilic meadows). Thus, the most representative populations within the researched habitats belong to the Chrysomelinae and Halticinae subfamilies, but within this the wooden species (forest), respectively the grassy ones (grassland) are disproportionately represented, namely 90.38% (Halticinae) and 65.38% (Chrysomelidae). The survey on the ecologic diversity of the chrysomelid population identified in the upper sector of the Mureş River has allowed us to reflect upon the degree of stability of the studied biocoenosis (Table 2).

For the calculation of the ecologic diversity we have used the Shannon-Wiener index from which we have deducted also the value of relative diversity that is the equitability index. The highest value of the ecologic diversity and equitability index was registered in case of the mesophilic meadows ($H = 1.35$; $e = 0.91$), followed by the riverside coppice ($H = 1.11$; $e = 0.80$) and the deciduous forests ($H = 1.03$, $e = 0.75$), densely populated habitats by chrysomelid species.

Table 2: Ecological diversity and equitability index values of the studied habitats within the upper basin of the Mureş River

Habitat	Shannon – Wiener Index	Equitability
Mesophile grassland	1.35	0.91
Meso-xerophilous Meadows	0.41	0.38
Meso-xerophilous Meadows	0.58	0.51
Spruce forests	0.38	0.34
Coniferous forests with deciduous	0.69	0.49
Beech forests	0.59	0.53
Deciduous forests	1.03	0.75
Pasture	0.68	0.33
Glades	0.65	0.43
Low-density forests	0.55	0.38
Riverside coppice	1.11	0.8
Marshes	0.99	0.41
Underwoods	0.69	0.61
Ruderal vegetation	0.59	0.47
Artificial Landscapes	0.21	0.22

The lowest values were recorded in artificial landscapes ($H = 0.21$, $e = 0.22$) and spruce forests ($H = 0.38$, $e = 0.38$). The anthropogenic effect is at its maximum within artificial landscapes, so that the majority of species occur accidentally and the population structure is subject to a permanent alteration. In case of spruce forests the grassy vegetation layer is poorer in host plant species for chrysomelids and the forests do not provide optimal nutrition and reproduction conditions for many chrysomelid species.

Conclusions

Our research took place in an area less studied in terms of the chrysomelid population contributing with new elements to the knowledge on chrysomelid populations in the Eastern Carpathians, the Toplița – Deda pass, the Gheorgheni depression. 15 types of habitats, illustrative for the research area, were investigated. We have conclusioned a differential distribution of chrysomelid populations according to the habitat even within the same subfamily, due to the different structure of biocoenosis.

REFERENCES

1. Bielz, A., 1887, Die Erforschung der Käferfauna Siebenbürgens, *Verhandlungen der Naturwissenschaften zu Hermannstadt*, **37**: 27–114.
2. Csiki, E., 1951, Fauna jukov Gorî Radna (Die Käferfauna des Rodnaer Gebirges), *Acta Biologica Academiae Scientiarum Hungaricae*, **2**: 119–168.
3. Fleck, E. D., 1905, Fam. Chrysomelidae, In: Die Coleopteren Rumäniens, *Bul. Soc. Sci., Bucharest*, **14**: 695–729.
4. Frivaldszky, J., 1871, Adatok Máramaros vármegye faunájához, *Math. és Természettud. Közlemények*, **9**: 183–232.
5. Crișan, A., 2006, Comparative analysis of leaf-beetles (Coleoptera, Chrysomellidae) from the scientific reserve Scărița-Belioara, Cheile Turzii and Cheile Turului (Transylvania, Romania), *Studia Univ. "Babeș-Bolyai", Biol.*, **51**, **2**: 3–13.
6. Crișan, A., 2004., Studii de biodiversitate în ecosisteme naturale din bazinul Arieșului., *Rev. Pol. st. Scient., Nr. spec.* 2005, **1/17–17/17**.
7. Maican, S., 2004, Contributions to the knowledge of the chrysomelid fauna (Coleoptera: Chrysomelidae) from Romanian Carpathians, *Acta Zoologica Universitatis Comeniana*, Bucharest, **46** (2): 107–114.
8. Freude, H., Harde, K.W., Lohse, G.A., 1966: Die Käfer Mitteleuropas. (Goeke & Evers), *Krefeld*, **9**: 95–299.
9. Szél, G., Rozner, I. & Kocs, I., 1995, Contribuții la cunoașterea coleopterelor din Transilvania (România) pe baza colectărilor din ultimii ani, *Acta Hargitensis II*, Aluta, **19**: 73–92.
10. Kaszab, Z., 1962, Levélbogarak – Chrysomelidae, In: *Magyarország Állatvilága (Fauna Hungariae)*, IX, **16**. Akadémiai Kiadó, Budapest, 416 p.
11. Gruev, B., Merkl, O. & Vig, K., 1993, Geographical distribution of Alticinae (Coleoptera, Chrysomelidae) in Romania, *Annales Historico-Naturales Musei Nationalis Hungarici*, **85**: 75–132.

CERCETĂRI FAUNISTICE ȘI ECOLOGICE ASUPRA FAMILIEI CHRYSOMELIDAE (COLEOPTERA) DIN BAZINUL SUPERIOR AL RÂULUI MUREȘ, CU REFERIRE SPECIALĂ ASUPRA REPREZENTĂRII SUBFAMILIILOR DE CRIZOMELIDE DIN HABITATELE CERCETATE (Rezumat)

Cercetările efectuate în bazinul superior al Mureșului, în perioada anilor 2005–2009, lunile mai – septembrie, au relevat un număr de 227 de specii de crizomelide din 48 de genuri aparținând la 10 subfamiliile. Au fost cercetate 15 tipuri de habitate reprezentative; diferențiate prin altitudine și structură biocenotică. Cele mai bine reprezentate sunt subfamiliile Halticinae cu 104 specii din 17 genuri, Chrysomelinae cu 52 de specii din 15 genuri, urmate de Chryptcephalinae cu 27 de specii din 2 genuri, Cassidinae cu 15 specii dintr-un singur gen, Galerucinae și Clytrinae cu 11 specii din 4 genuri, Criocerinae cu 4 specii din 2 genuri, respectiv Donaciinae, Zeugophorinae, Lamprosomatinae, cu câte o specie. Populațiile cele mai stabile, potrivit indicilor de diversitate ecologică și de echitabilitate, sunt din habitatele de pajști mezofile, zăvoaie și păduri de foioase.

SOME INVERTEBRATES IN ARABLE FIELDS FROM THE REPUBLIC OF MOLDOVA

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Abstract: This paper presents the taxonomical and ecological data on some invertebrates from two arable fields: alfalfa and winter wheat. For the first time in the Republic of Moldova 20 species of Collembola from 17 genera and 7 families (Hypogastruridae, Onychiuridae, Isotomidae, Entomobryidae, Sminthuridae, Katiannidae and Sminthuridae) from alfalfa field were registered. In the same culture 36 species of Coleoptera from 20 genera and 7 families (Carabidae, Silphidae, Scarabaeidae, Coccinellidae, Tenebrionidae, Trogidae and Cerambycidae) have been identified. In the winter wheat crop only coleopterans were studied and 46 species from 25 genera and 5 families (Carabidae, Scarabaeidae, Silphidae, Cerambycidae and Tenebrionidae) have been registered. Common to both cultures were 18 species of coleopterans. The most characteristic for these cultures have been the specimens of the families Carabidae and Scarabaeidae, the last being attracted to baited traps (small rodents fallen accidentally in traps).

Keywords: alfalfa, Coleoptera, collembola, species diversity, winter wheat.

Introduction

Agricultural ecosystems constitute about 75.6% of the territory of Moldova. This leads to a drastic ecological disturbance, to the intensive exploitation of natural resources. In the agricultural sector, which has a significant impact upon the environment, the measures on maintaining ecological balance, including the preservation of entomofaunistic complexes, are very important. It is known that in agrocoenoses, during many years of using, specific faunistic entomocomplexes were formed, which include species of harmful, useful and neutral insects. Useful insects in agricultural ecosystems must be maintained in spite of the agricultural activities, also should be preserved and renewed the adjacent forest shelter belts where the insects migrates after harvesting crops. The success agriculture derives from the stability of ecosystems, where the entomofauna is a basic component. In these aim two main crops has been selected where faunistic studies were accomplished in order to identify existing entomocomplexes.

Material and methods

Faunistic material was collected from the alfalfa field (*Medicago* sp.) near Trebujeni locality and in the winter wheat crop, near Branzeni locality in the summer of 2008 and 2010 years. During the collection of invertebrates the abiotic parameters such as soil and air temperature, soil

humidity and pH were measured. Several methods have been used for sampling. For Collembola soil samples with a surface of 5 x 5 cm² were taken, which were extracted using flotation method. Coleopterans were collected using Barber soil traps. As a result of investigation 95 specimens of Collembola and 1577 specimens of Coleoptera were analyzed. To identify the coleopterans species the recommended for this purpose Identification Manual was used [3]. The processing of collected materials various ecological parameters have been used such as: abundance (A), dominance (D), constancy (C) and ecological significance index (W) (Tab. 2, 3). Financial support was provided by the project № 10.820.04.16/RoA.

Results and discussions

As a result of the study the new data on species composition, abundance and dominance of invertebrates from alfalfa and winter wheat crops were obtained.

From the soil samples taken in the alfalfa field – 95 specimens of Collembola were extracted. The species diversity of Collembola from the alfalfa field has been studied for the first time in the Republic of Moldova. As a result 20 species of Collembola, belonging to 17 genera and 7 families (Hypogastruridae, Onychiuridae, Isotomidae, Entomobryidae, Sminthuridae, Katiannidae and Sminthuridae) were found. Some epigeic Collembola were also extracted from Barber traps. During the collection of faunistic material the abiotic parameters such as soil and air temperature – 26.4 °C and 30.3 °C respectively, soil humidity – 13, 57% and pH – 7.0 were measured and calculated for the alfalfa. The most abundant and dominant collembolan species for the alfalfa field were *Heteromurus major*, *Lepidocyrtus cyaneus*, *Hypogastrura viatica*, *Isotoma viridis*, *Metaphorura affinis* and *Mesaphorura critica* (Tab. 1).

Table 1: Sinecological analysis of Collembola species from alfalfa field

No	Species	Abundance	Dominance	Class
1.	<i>Heteromurus major</i> (Moniez, 1889)	36	37,9	D ₅
2.	<i>Lepidocyrtus cyaneus</i> Tullberg, 1871	9	9,5	D ₄
3.	<i>Hypogastrura viatica</i> (Tullberg, 1872)	8	8,4	D ₄
4.	<i>Isotoma viridis</i> Bourlet, 1839	7	7,3	D ₄
5.	<i>Metaphorura affinis</i> (Börner, 1902)	6	6,3	D ₄
6.	<i>Mesaphorura critica</i> Ellis, 1976	5	5,2	D ₄
7.	<i>Protaphorura sakatoi</i> (Yosii, 1966)	3	3,15	D ₃
8.	<i>Lepidocyrtus paradoxus</i> Uzel, 1890	3	3,15	D ₃
9.	<i>Sminthurinus</i> sp.	3	3,15	D ₃
10.	<i>Orchesella multifasciata</i> Stscherbakow, 1898	2	2,1	D ₃
11.	<i>Pseudosinella octopunctata</i> Börner, 1901	2	2,1	D ₃
12.	<i>Sminthurus viridis</i> (Linnaeus, 1758)	2	2,1	D ₃
13.	<i>Parisotoma notabilis</i> (Schaffer, 1896)	2	2,1	D ₃
14.	<i>Ceratopsella denticulata</i> (Bagnall, 1941)	1	1,05	D ₁
15.	<i>Folsomides parvulus</i> Stach, 1922	1	1,05	D ₁
16.	<i>Isotomodes productus</i> (Axelson, 1906)	1	1,05	D ₁
17.	<i>Folsomia quadrioculata</i> (Tullberg, 1871)	1	1,05	D ₁
18.	<i>Lepidocyrtus lanuginosus</i> (Gmelin, 1788)	1	1,05	D ₁
19.	<i>Pseudosinella moldavica</i> Gama & Bușmachi, 2002	1	1,05	D ₁
20.	<i>Sphaeridia pumilis</i> (Krausbauer, 1898)	1	1,05	D ₁

Euedaphic Collembola are small invertebrates closely connected to the life conditions of soil and strongly depend on its humidity and the presence of nutrients in the soil. It is shown by

other researchers [1, 2] that the collembolans prefer non-weedind crops and Fabaceae cultures rich in nitrogen. In July, when the faunistic material was collected, air and soil temperature were high and the drought has caused a lower percentage of soil humidity, which eventually decreased the number of Collembola individuals and species in the alfalfa field. This fact has also proved the small number of soil euedaphic species such as *Metaphorura affinis*, *Mesaphorura critica*, *Folsomides parvulus* and *Protaphorura sakatoi*. Their total numbers of specimens were only 15. Other species from epigeic and hemiedaphic groups were active during the day feeding algae, pollen and bacteria from plants and soil surface. It was proven the presence of two specimens of phytophagous species *Sminthurus viridis* named also “Lucerne flea”, which in large quantities can do some damage to alfalfa.

To collect coleopterans from alfalfa field were performed 10 extractions with 10 traps at intervals of 10 to 15 days. In total there were registered 36 species of beetles. The largest family proved to be Scarabaeidae, which includes 14 species from 6 genera, followed by family Carabidae with 10 species and 6 genera. The families Silphidae was represented by 6 species from 4 genera and Cerambycidae – by 3 species belonging to one genus. Families Coccinellidae, Tenebrionidae and Trogidae had only one species each. The most abundant, dominant and characteristic species for the alfalfa culture were *Tanathophilus rugosus* and *Opatrum sabulosum*, other species were accidental (Tab. 2).

Table 2: Sinecological analysis of coleopteran cenoses from alfalfa field

No	Species	A	D		C		W	
			%	Class	%	Class	%	Class
1.	<i>Tanathophilus rugosus</i> (Linnaeus, 1758)	789	65,04	D ₅	14	C ₁	9,5	W ₄
2.	<i>Opatrum sabulosum</i> (Linnaeus, 1761)	179	14,75	D ₅	23	C ₁	3,39	W ₃
3.	<i>Onthophagus verticicornis</i> Leicharting, 1781	41	3,38	D ₃	5	C ₁	0,17	W ₁
4.	<i>Dorcadion tauricum</i> Waltl, 1838	37	3,05	D ₃	18	C ₁	0,55	W ₁
5.	<i>Onthophagus coenobita</i> (Herbst, 1783)	31	2,55	D ₃	10	C ₁	0,25	W ₁
6.	<i>Onthophagus fracticicornis</i> Preyssler, 1790	22	1,81	D ₂	6	C ₁	0,07	W ₁
7.	<i>Aphodius fossor</i> (Linnaeus, 1758)	11	0,90	D ₁	3	C ₁	0,027	W ₁
8.	<i>Aphodius rufipes</i> (Linnaeus, 1758)	11	0,90	D ₁	3	C ₁	0,027	W ₁
9.	<i>Trox sobulosus</i> (Linnaeus, 1758)	11	0,90	D ₁	8	C ₁	0,072	W ₁
10.	<i>Onthophagus ovatus</i> (Linnaeus, 1758)	9	0,74	D ₁	14	C ₁	0,10	W ₁
11.	<i>Lethrus apterus</i> Laxmann, 1770	7	0,57	D ₁	7	C ₁	0,04	W ₁
12.	<i>Silpha obscura</i> Linnaeus, 1758	7	0,57	D ₁	5	C ₁	0,03	W ₁
13.	<i>Onthophagus taurus</i> Schreber, 1759	6	0,49	D ₁	3	C ₁	0,014	W ₁
14.	<i>Carabus coriaceus</i> Kraatz, 1877	6	0,49	D ₁	5	C ₁	0,03	W ₁
15.	<i>Nicrophorus fossor</i> Erichson, 1837	5	0,41	D ₁	2	C ₁	0,01	W ₁
16.	<i>Nicrophorus vispilloides</i> Herbst, 1784	5	0,41	D ₁	2	C ₁	0,01	W ₁
17.	<i>Cetonia aurata</i> (Linnaeus, 1758)	4	0,32	D ₁	4	C ₁	0,01	W ₁
18.	<i>Harpalus distinguendus</i> (Duftschmid, 1812)	4	0,32	D ₁	2	C ₁	0,01	W ₁
19.	<i>Harpalus rufipes</i> (De Geer, 1774)	3	0,24	D ₁	3	C ₁	0,01	W ₁
20.	<i>Abax carinatus</i> (Duftschmid, 1812)	2	0,16	D ₁	2	C ₁	0,01	W ₁
21.	<i>Abax parallelopipedus</i> (Pill, Mitterpacher, 1783)	2	0,16	D ₁	2	C ₁	0,01	W ₁
22.	<i>Aphodius fimetarius</i> (Linnaeus, 1758)	2	0,16	D ₁	1	C ₁	0,01	W ₁
23.	<i>Carabus convexus</i> Fabricius, 1775	2	0,16	D ₁	1	C ₁	0,01	W ₁
24.	<i>Ophonus rufibarbis</i> (Fabricius, 1792)	2	0,16	D ₁	2	C ₁	0,01	W ₁
25.	<i>Onthophagus vacca</i> (Linnaeus, 1767)	2	0,16	D ₁	2	C ₁	0,01	W ₁

26.	<i>Pentodon idiota</i> Herbst, 1789	2	0,16	D ₁	2	C ₁	0,01	W ₁
27.	<i>Silpha carinata</i> Herbst, 1783	2	0,16	D ₁	2	C ₁	0,01	W ₁
28.	<i>Amara familiaris</i> (Duftschmid, 1812)	1	0,08	D ₁	1	C ₁	0,01	W ₁
29.	<i>Aphodius luridus</i> (Fabricius, 1775)	1	0,08	D ₁	1	C ₁	0,01	W ₁
30.	<i>Anisoplia austriaca</i> (Herbst, 1783)	1	0,08	D ₁	1	C ₁	0,01	W ₁
31.	<i>Anchomenus dorsale</i> (Pontoppidan, 1763)	1	0,08	D ₁	1	C ₁	0,01	W ₁
32.	<i>Dorcadion</i> sp.	1	0,08	D ₁	1	C ₁	0,01	W ₁
33.	<i>Dorcadion fulvum</i> (Scopoli, 1763)	1	0,08	D ₁	1	C ₁	0,01	W ₁
34.	<i>Harpalus tardus</i> (Panzer, 1797)	1	0,08	D ₁	1	C ₁	0,01	W ₁
35.	<i>Phosphuga atrata</i> (Linnaeus, 1758)	1	0,08	D ₁	1	C ₁	0,01	W ₁
36.	<i>Coccinella septempunctata</i> (Linnaeus, 1758)	1	0,08	D ₁	1	C ₁	0,01	W ₁
	total	1213						

In winter wheat crop in the Branzeni locality 5 collections were made using 10 traps at an interval of 10 days. A total of 46 species of beetles were registered. The largest family was Carabidae with 34 species from 16 genera, followed by Silphidae family with 5 species from 3 genera and by Scarabaeidae family with 4 species from 3 genera. From Cerambycidae family 2 species belonging to 2 genera and from Tenebrionidae family one species were found. As result of processing the ecological parameters, the most abundant, dominant and characteristic species for winter wheat crop were *Opatrum sabulosum* and *Harpalus distinguendus*, followed by the species *Nicrophorus vispilloides* and *Tanathophilus rugosus*, other species were subdominant, recedent and subrecedent (Tab. 3).

Table 3: Sinecological analysis of coleopteran cenoses from winter wheat crop

No.	Species	A	D		C		W	
			%	Class	%	Class	%	Class
1.	<i>Opatrum sabulosum</i> (Linnaeus, 1761)	75	20,61	D ₅	63,2	C ₃	13,02	W ₅
2.	<i>Harpalus distinguendus</i> (Duftschmid, 1812)	56	15,39	D ₅	41,8	C ₂	6,43	W ₄
3.	<i>Nicrophorus vispilloides</i> Herbst, 1784	31	8,52	D ₄	24,7	C ₁	2,10	W ₃
4.	<i>Tanathophilus rugosus</i> (Linnaeus, 1758)	19	5,22	D ₄	12,7	C ₁	0,67	W ₂
5.	<i>Onthophagus verticicornis</i> Leicharting, 1781	17	4,67	D ₃	10,76	C ₁	0,50	W ₂
6.	<i>Nicrophorus fossor</i> Erichson, 1837	17	4,67	D ₃	10,76	C ₁	0,50	W ₂
7.	<i>Harpalus picipennis</i> Duftschmid, 1812	15	4,12	D ₃	10,76	C ₁	0,44	W ₂
8.	<i>Ophonus rufibarbis</i> (Fabricius, 1792)	15	4,12	D ₃	10,76	C ₁	0,44	W ₂
9.	<i>Harpalus rufipes</i> (De Geer, 1774)	14	3,85	D ₃	9,80	C ₁	0,38	W ₂
10.	<i>Harpalus tardus</i> (Panzer, 1797)	13	3,57	D ₃	9,43	C ₁	0,34	W ₂
11.	<i>Ophonus gammeli</i> (Schauberger, 1933)	11	3,02	D ₃	9,80	C ₁	0,30	W ₂
12.	<i>Carabus cancellatus</i> Illiger, 1798	9	2,47	D ₃	9,43	C ₁	0,23	W ₂
13.	<i>Harpalus atratus</i> Latreille, 1804	7	1,92	D ₂	5,21	C ₁	0,1	W ₂
14.	<i>Poecilus cupreus</i> (Linnaeus, 1758)	6	1,65	D ₂	5,21	C ₁	0,1	W ₂
15.	<i>Amara ovata</i> (Fabricius, 1792)	5	1,37	D ₂	4,73	C ₁	0,07	W ₁
16.	<i>Platynus assimile</i> (Paykull, 1790)	5	1,37	D ₂	4,73	C ₁	0,07	W ₁
17.	<i>Harpalus rubripes</i> (Duftschmid, 1812)	5	1,37	D ₂	4,73	C ₁	0,07	W ₁
18.	<i>Caccobius schreberi</i> (Linnaeus, 1758)	4	1,09	D ₁	2,34	C ₁	0,03	W ₁
19.	<i>Silpha carinata</i> Herbst, 1783	4	1,09	D ₁	2,34	C ₁	0,03	W ₁
20.	<i>Ophonus schaubergerianus</i> Puel, 1937	3	0,82	D ₁	2,63	C ₁	0,02	W ₁
21.	<i>Poecilus sericeus</i> (Fischer von Waldheim, 1823)	3	0,82	D ₁	2,63	C ₁	0,02	W ₁
22.	<i>Rhagium sycophanta</i> (Schrank, 1781)	2	0,55	D ₁	1,17	C ₁	0,01	W ₁
23.	<i>Dorcadion fulvum</i> (Scopoli, 1763)	2	0,55	D ₁	2,34	C ₁	0,02	W ₁
24.	<i>Chlaenius vestitus</i> (Paykull, 1790)	2	0,55	D ₁	1,17	C ₁	0,01	W ₁

25.	<i>Amara similata</i> (Gyllenhal, 1810)	2	0,55	D ₁	2,34	C ₁	0,02	W ₁
26.	<i>Anchomenus dorsale</i> (Pontoppidan, 1763)	2	0,55	D ₁	2,34	C ₁	0,02	W ₁
27.	<i>Stenolophus discophorus</i> Fischer von Waldheim, 1823	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
28.	<i>Carabus convexus</i> Fabricius, 1775	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
29.	<i>Harpalus griseus</i> (Panzer, 1797)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
30.	<i>Dromius agilis</i> (Fabricius 1787)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
31.	<i>Harpalus latus</i> (Linnaeus, 1758)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
32.	<i>Abax parallelopedus</i> (Pill, Mitterpacher, 1783)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
33.	<i>Ophonus diffinis</i> (Dejean, 1829)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
34.	<i>Harpalus oblitus</i> Dejean, 1829	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
35.	<i>Anisodactylus signatus</i> Panzer, 1797	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
36.	<i>Pterostichus strenuus</i> (Panzer, 1796)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
37.	<i>Harpalus smaragdinus</i> (Duftschmid, 1812)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
38.	<i>Amara familiaris</i> (Duftschmid, 1812)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
39.	<i>Licinus silphoides</i> (Rossi, 1790)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
40.	<i>Badister bipustulatus</i> (Fabricius, 1792)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
41.	<i>Cetonia aurata</i> (Linnaeus, 1761)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
42.	<i>Silpha obscura</i> Linnaeus, 1758	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
43.	<i>Panagaeus bipustulatus</i> (Fabricius, 1775)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
44.	<i>Onthophagus ovatus</i> (Linnaeus, 1758)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
45.	<i>Carabus excellens</i> Kraatz, 1887	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
46.	<i>Calathus halensis</i> (Schaller, 1783)	1	0,27	D ₁	1,17	C ₁	0,01	W ₁
	total	364						

The taxonomical analysis shows that Coleopterans from families Carabidae and Scarabaeidae are most characteristic for the studied cultures; they recorded the highest number of species. Also families Scarabaeidae, Silphidae and Trogidae were attracted by the bait, when the small rodents accidentally fallen in raps, which increased sample efficiency. Winter wheat crop had higher species diversity by comparison with the culture of alfalfa (probably due to increased soil humidity in northern zone of the republic where more precipitations than the center were recorded). Common to both cultures were 18 species of beetles (Fig. 1).

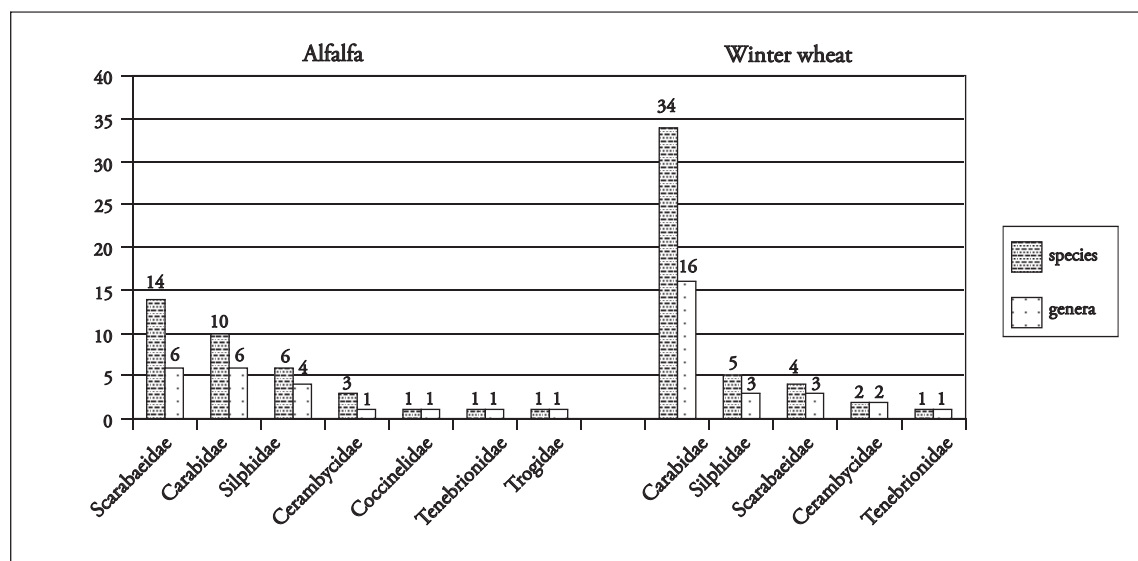


Fig. 1: Taxonomic structure of coleopterans families from alfalfa and winter wheat crops

According to trophic regime in winter wheat crops were emphasized 21 phytophagous species, 15 predators, 4 necrophagous, 3 coprophagous and 3 mixophagous. While the culture of

alfalfa 13 phytophagous, 10 coprophagous, 8 predators and 5 necrophagous species were registered. Within the Carabidae family phytophagous species prevail; predatory species constitute 46% in winter wheat crops and 34% in the alfalfa.

After the comparison accomplished between studied fields it was found that representatives of the family Carabidae are typical component of entomological complexes from both cultures, including phytophagous and predatory species.

As a whole in crop of alfalfa were collected 1308 specimens of invertebrates. Among them 95 specimens are Collembola belonging to 20 species, 17 genera and 7 families; 1213 are coleopterans from 36 species, 20 genera and 7 families. In the winter wheat crop 364 specimens of coleopterans belonging to 46 species, 25 genera and 5 families have been collected.

It is very important to know the status of predatory populations of Carabidae in agricultural ecosystems and to increase their potential as agents of biocontrol and to determine which agricultural practices can have a positive influence on the Carabidae populations [4]. Soil processing of the agricultural crops has strongest influences on insect complexes, during this period the coleopterans find refuge to the edge of fields and adjacent forest shelter belts.

Conclusions

The studies of invertebrate communities from the alfalfa field and winter wheat crop revealed 20 species of Collembola and 64 species of Coleoptera characteristic for these cultures.

The species abundance and dominance established in both cultures and the comparative analysis revealed that the representatives of Carabidae family are typical component of entomological complexes of the studied cultures, including the species phytophagous and predators.

BIBLIOGRAPHY

1. Călugăr, M., Rusan, M., Huțu, M., Bulimar, F., Vițalariu, C., Davidescu, G., Catargiu, D., 1987, Efectul asolamentului asupra microflorei și microartropodelor edafice, *Analele științifice ale Universității "Al. I. Cuza" din Iași. Biologie*, V, **33 (II)**: 73–76.
2. Călugăr, M., Bulimar, F., Huțu, M., 1991, Implicațiile gospodăririi solurilor asupra microartropodelor edafice, *Cercetări agronomice în Moldova. Rezultate – Recomandări*, Iași, V, **24 (1–2)**: 139–144.
3. Kryzanovskij, O. L., 1965, *Opredelitel' nasekomyh evropejskoj časti SSSR*. T. 2. Moskva-Leningrad: Nauka, 646 p.
4. Neculiseanu, Z., 1991, Obzor fauny žuželic Moldovy, *Izv. ANMSSR, ser.biol. i. him. Nauc*, T. 2: 37–42.

DATE DESPRE UNELE NEVERTEBRATE DIN TERENURILE AGRICOLE DIN REPUBLICA MOLDOVA (Rezumat)

Lucrarea prezintă date faunistice și ecologice privind fauna de colembole și de coleoptere din culturile de lucernă și de grâu de toamnă. Pentru prima dată în fauna Republicii Moldova au fost evidențiate din cultura de lucernă 20 de specii de colembole. Acestea fac parte din 17 genuri și aparțin la 7 familii (Hypogastruridae, Onychiuridae, Isotomidae, Entomobryidae, Sminthuridae, Katiannidae și Sminthuridae). De asemenea, au fost identificate 36 de specii de coleoptere, care fac parte din 20 de genuri și aparțin la 7 familii (Carabidae, Silphidae, Scarabaeidae, Coccinellidae, Tenebrionidae, Trogidae și Cerambycidae). Din cultura de grâu de toamnă au fost analizate doar coleopterele. Au fost identificate 46 de specii, ce fac parte din 25 genuri și aparțin la 5 familii (Carabidae, Scarabaeidae, Silphidae, Cerambycidae și Tenebrionidae). Din cele 46 de specii de coleoptere identificate, 18 sunt comune pentru ambele culturi. Cele mai caracteristice specii pentru aceste culturi au fost cele din familiile Carabidae și Scarabaeidae. Scarabeidele au fost atrase în capcane de către momeală (rozătoare mici nimerite întâmplător în capcane).

APPLICATION OF ALLOMETRIC CONDITION FACTOR IN STUDYING OF WINTERING PERIOD INFLUENCE ON THE CONDITION STATUS OF JUVENILE REARED CYPRINIDS SPECIES

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Abstract: A large range of environmental and biological factors typical for cold season, their daily fluctuations and also anthropogenic factors (fish handling, technological operations etc) influence the physiological status of fish at individual level and its effects could be quantified by multiple biomarkers from different levels of biological organization.

The Fulton Condition Factor represents one of these quantifiers related to condition status in fish. This index provides important information in connection with physiological status of fish and comparative researches of distinguishes populations allow the living environment quality assessment.

There is not yet an agreement referring to the ways by which data are gathered for Condition Factor calculation. There are several authors that show the formula $K = W/L^3$ is not a real representation of the length/weight relationship for the great majority of fish species. An alternative method of fish condition state assesment using the Allometric Condition factor by means of the expression $K = W/L^b$ has been developed in present paper in order to analyzed the distortions induced by the different calculating methods of b coefficient corresponding to the sampled individuals from four reared juvenile cyprinids species exposed to the winter factors influence.

Keywords: Fulton Condition Factor, juvenile reared cyprinids

Introduction

A large range of environmental and biological factors typical for cold season, their daily fluctuations and also anthropogenic factors (fish handling, technological operations etc.) influences the physiological status of fish at individual level and its effects could be quantified by multiple biomarkers from different levels of biological organization.

The Fulton Condition Factor represents one of these quantifiers related to condition status. This paper is a part from a larger study that proposed the physiological assessment of four reared juvenile cyprinids species under the wintering factors influence and it developed during several years.

The nutritional status of fish changes after a seasonal cycle in relation with the food availability and modifications of feeding behavior. The fish sampling before and after winter period reveals seasonal variation of biometric indices [12]. The Fulton Condition Factor is an index of employed regularly in fisheries and is based on length and weight of the animal assuming that

heavier fish are in better condition than lighter of the same length [8, 15]. Any stressors in the natural environment can have an effect on fish overall health and condition. Therefore, this factor can be employed as an interactive biomarker; both anthropogenic and natural stressors are incorporated into Fulton Factor. However, there are natural fluctuations or differences in condition factor of fish to species, sex and season (e.g. temperature, spawning, photoperiod, prey quantity/quality) [4, 8, 15], so, special attention must be given to these variables when developing the research strategies.

The condition status evaluated by the weight/length ratio depends on the fish body shape: the bigger body height and thickness are related with an increased Fulton factor than the fish with thin and long body.

This index provides important information in connection with physiological status of fish having in view the specimens with the same body length have a better condition as a greater body weight is. Additionally, the comparative researches of distinguishes populations allow the living environment quality assessment [9].

Materials and methods

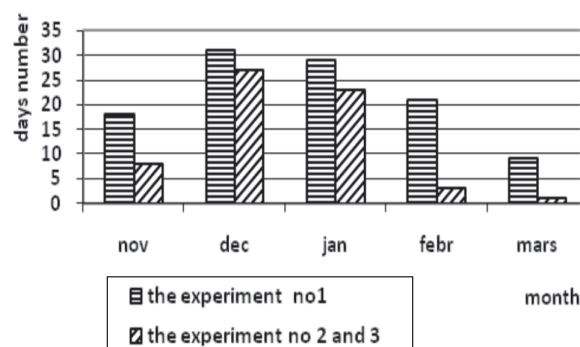
The research period. The experiments were performed in varied winter conditions during two years and fish sampling was made before and after cold season.

Tab. 1: Length of stocking time of fish into the winter ponds

Experiment	Duration (days)
The experiment no 1 (Brates station)	120
The experiment no 2 (Brates station)	108
The experiment no 3 (Vladesi station)	151

The number of the days with negative temperature is shown in figure 1.

Fig. 1: The days number with negative temperature during on experimental period



Fish sampling stations. The fish samples were collected from the ponds of two fish farms from Galati County. The farms have similar climatic conditions and partially the same water sources.

- Brates experimental fish nursery from Institute of research and development for aquatic Ecology, Fishing and Aquaculture, Galati.
- Vladesi fish farm.

The water source is supplied from Danube River and Brates Lake in case of Brates nursery and also from Prut River in case of both fish farms.

The experiments were proceeded on four reared juvenile cyprinids species: common carp, *Cyprinus carpio carpio* Linnaeus, 1758, grass carp, *Ctenopharyngodon idella* (Valenciennes, 1844),

silver carp, *Hypophthalmichthys molitrix* (Valenciennes, 1844) and big head carp *Aristichthys nobilis* (Richardson, 1845).

A total of 1370 specimens of all four cyprinids were sampled during two years in the three experiments, on the pre-winter period (autumn) and after winter pond harvesting (spring) respectively.

Before biometric measurements by ichthyometer, the fish were kept into aquaria for a 24 hours period to empty the digestive tract content.

The minimum and maximum values of the biometric parameters from each species and also the statistical differences ($P < 0.05$, *T-Student* test) between the values arrays measured before and after wintering were recorded in the tables.

The graphics indicate the average values and also the quartile range (25–75%) for each biometric parameter.

The allometric condition factor is described by the expression:

$$K = W/L^b$$

in which W represents the weight.

L represents the standard length.

b represents a coefficient that is estimated by the weight/length regression curve equation ($W = a \cdot L^b$) being adjusted from data of the sampled individuals.

a represents the slope of the regression curve.

Results and discussions

The normal value for Fulton Factor as indicator of a good condition status mentioned by scientific papers is differed. So, some of fish culture books mention the next minimum value of K reached by juvenile common carp:

- 1.8 for the fish with a weight lower than 10 g;
- 1.7 for the fish with 10–30 g range weight;
- 1.6 for the fish with a weight bigger than 30 g.

Some authors [10, 16] estimated that next values of K could allow the survival of juvenile common carp and reduced weight losses during the winter.

- minimum K 1.6 for the fish with a weight more than 20 g.
- minimum K 1.7 for the 15 – 20 g range weight.
- minimum 2.0 for the fish with a weight lower than 15 g.

The survival time of common carp with different condition state levels under starvation circumstances mentioned by Nikolski, G., V. (1962) [13] is shown in table 2.

Tab. 2: The survival time of common carp (*Cyprinus carpio carpio* Linnaeus, 1758) under starvation circumstances in relation with condition state levels [13]

Fulton Factor	Lipids content (%)	Survival period (days)
2.56	2.15	141
2.81	4.25	191

The Fulton Factor in genuine grass carp, *Ctenopharyngodon idella* (Valenciennes, 1844) as indicator of a good condition status recommended by Kirpicinikov & Berg quoted by Nikolski, G., V., (1962) [13] is $K = 2.4$ while the culture grass carp has 2.9 and the hybrids $K = 2.7$. The same author mentions these values in relation with the weight ranges as it is shown in table 3.

Tab. 3: The Condition Factor in relation with the weight in genuine grass carp juvenile, *Ctenopharyngodon idella* (Valenciennes, 1844) (Kirpicinikov & Berg quoted by Nikolski, G., V., (1962) [13]

Body weight (g)	> 25	15–25	< 15
Condition Factor, K	2.5–2.6	2.7	2.9

Georgescu, R. and others (1991) [6] note the next values of the Condition Factor for some cyprinids species as index of good physiological state reached before the cold season: 2.2–3.15 in common carp, 1.22–1.9 in silver carp, 1.34–1.63 in grass carp.

Gheracopol, O. (1971) [7] assessed the variation of the Condition Factor in common carp juvenile under wintering conditions as is shown in table 4.

Tab. 4: The Condition Factor dynamic in relation with the weight in two juvenile common carp races (*Cyprinus carpio* Linnaeus, 1758) (Gheracopol, O., 1971) [7]

Biometric index	Common carp – Lausitz race			Common carp – Galitia race		
	Autumn	Spring	Modification degree	Autumn	Spring	Modification degree
Fulton Factor	3.53	2.95	14.43	3.41	3.19	6.45
Weight (g)	50.65	43.25	14.61	48.49	42.88	11.57

There is not yet an agreement referring to the ways by which data are gathered for Condition factor calculation. An old method uses the formula $K = W/L^3$ for Condition Index assessment. Several authors [8, 9] discuss, however the method's employment and conclude it does not permit the comparison of results obtained from individuals with distinct sizes, because the use of the exponent 3 (the coefficient $b = 3.0$ corresponds to izometric growing) is not a real representation of the length and weight relationship for the great majority of fish species, the fish condition shows a variation in function of their length.

As an alternative, the greater part of the cited authors propose the use of Allometric Condition factor by means of the expression $K = W/L^b$.

Some of the authors estimate this coefficient from only one equation which links all the analysed individuals from the subsamples [2, 3, 14]. Others calculate a b value to each subsample, separating, for instance individuals caught in distinct seasons [5] or distinct genders [1].

In connection with the subject of present paper regarding the assessment of the juvenile cyprinids condition state under seasonal factors influence, significant are the results obtained by Lima-Jr, S., E., (2002) [9]. By calculating the Allometric Condition Factor of the fish with the same length range from the distinct seasons, there is a directly proportional relationship between K and weight. Consequently, the higher is the weight of individuals with the same length, the higher would be their Condition Factor. From such concept, since individuals in a sample show no statistically distinct length, the Condition Factor variation should follow the weight variation of these individuals.

But the weight/length relationship can show a positive or negative allometric grow.

The results cited in the scientific literature [9] shows that by applying two different methods for Fulton Factor assessment (based both on constant b coefficient, calculated for all individuals from the samples collected during on four seasons and variable b coefficient, calculated for each subsample that is seasonally extracted), it can see the predicted results of weight/length relationship for the first method and distorted values for the 2nd method.

In this paper, it analyzed the distortions induced by the different calculating methods of b coefficient corresponding to the fish sampled during the experiments.

The Allometric Condition Factor corresponding to each cyprinid species was calculated by the two distinct methods: 1) variable b coefficient obtained for each subsample, extracted before and after winter season and 2) constant b coefficient for the two seasons (autumn and spring).

The equations of weight/length relationship adjusted to individuals separated for each subsample, extracted at the beginning and the end of the winter respectively is shown in table 5. It can observe b coefficient tends to 3 value in all four species that is in agreement with previous results cited by scientific papers [11].

A bigger value of determination coefficient (R-squared) than 0.8805 shows a high degree of confidence of weigh/length relationship from the regression curve.

Tab. 5: Allometric method for calculation of Condition Factor using variable b coefficient (corresponding to mathematic relationship between weight and length of the individuals separated for each subsample extracted before and after winter during the three experiments)

Species	Experiment	Nr of analysed individuals of each seasonal subsample		Season	Weight/length relationship (variable b value, Brates sampling station)	Weight/length relationship (variable b value, Vlădești sampling station)
		Brates station	Vlădești station			
Common carp	2, 3	57	50	Autumn	$W = 0.0296 * L^{3.0264}$ $R^2 = 0.9525$	$W = 0.0461 * L^{2.8068}$ $R^2 = 0.9207$
		46	61	Spring	$W = 0.013 * L^{3.3014}$ $R^2 = 0.9648$	$W = 0.0269 * L^{2.9857}$ $R^2 = 0.9561$
	1	25		Autumn	$W = 0.0238 * L^{3.0855}$ $R^2 = 0.9818$	
		75		Spring	$W = 0.0159 * L^{3.2557}$ $R^2 = 0.9696$	
Grass carp	2	29		Autumn	$W = 0.0272 * L^{2.894}$ $R^2 = 0.9816$	Defficient data
		83		Spring	$W = 0.0178 * L^{2.9945}$ $R^2 = 0.983$	Defficient data
	1	17		Autumn	$W = 0.0195 * L^{2.9886}$ $R^2 = 0.9914$	
		25		Spring	$W = 0.0174 * L^{2.9927}$ $R^2 = 0.9742$	
Silver carp	2, 3	95	204	Autumn	$W = 0.0314 * L^{2.7548}$ $R^2 = 0.9659$	$W = 0.0243 * L^{2.8488}$ $R^2 = 0.8805$
		57	71	Spring	$W = 0.0163 * L^{2.9734}$ $R^2 = 0.9313$	$W = 0.011 * L^{3.1368}$ $R^2 = 0.9517$
	1	34		Autumn	$W = 0.0182 * L^{2.9324}$ $R^2 = 0.9752$	
		146		Spring	$W = 0.0193 * L^{2.9007}$ $R^2 = 0.8585$	

Big head carp	2, 3		148	Autumn	lipsa date	$W = 0.0314 * L^{2.7271}$ $R^2 = 0.9462$
		27	71	Spring	$W = 0.0099 * L^{3.3765}$ $R^2 = 0.9378$	$W = 0.0113 * L^{3.2243}$ $R^2 = 0.9377$
	1	17		Autumn	$W = 0.0185 * L^{3.0269}$ $R^2 = 0.9039$	
		34		Spring	$W = 0.017 * L^{3.0059}$ $R^2 = 0.7228$	

The 2nd calculation method for b coefficient (b constant value) and the equations of weight/length relationship for the four cyprinids species sampled during the experiments are shown in table 6.

Tab. 6: Allometric method for calculation of Condition Factor using constant b coefficient (corresponding to mathematic relationship between weight and length of the individuals from the subsumed samples, extracted before and after winter during each of the three experiments)

Species	Experiment	Nr of analysed individuals of each seasonal subsample		Weight/length relationship (constant b value, Brates sampling station)	Weight/length relationship (constant b value, Vlădeşti sampling station)
		Brates station	Vlădeşti station		
Common carp	2, 3	103	111	$W = 0.019 * L^{3.1785}$ $R^2 = 0.9465$	$W = 0.0458 * L^{2.7837}$ $R^2 = 0.9297$
	1	100		$W = 0.0195 * L^{3.1641}$ $R^2 = 0.9765$	
Grass carp	2, 3	112		$W = 0.0274 * L^{2.8206}$ $R^2 = 0.9533$	Defficient data
	1	42		$W = 0.0148 * L^{3.0741}$ $R^2 = 0.9748$	
Silver carp	2, 3	152	275	$W = 0.0446 * L^{2.5755}$ $R^2 = 0.9534$	$W = 0.0486 * L^{2.4984}$ $R^2 = 0.8814$
	1	180		$W = 0.0186 * L^{2.9171}$ $R^2 = 0.9$	
Big head carp	2, 3	27	214	$W = 0.0099 * L^{3.3765}$ $R^2 = 0.9378$	$W = 0.026 * L^{2.8255}$ $R^2 = 0.8814$
	1	51		$W = 0.0182 * L^{2.9974}$ $R^2 = 0.7328$	

The allometric Condition Factor, K' (with variable b coefficient) and K'' (with constant b coefficient) (confidence intervals with 95% confidence level) of fish sampled during the experiments is shown in tables 7, 8, 9, 10.

Tab. 7: Allometric Condition Factor (variable and constant b coefficients both) and statistically comparisons ($P < 0,05$, t -Student test) between the samples collected in autumn and spring in common carp (*Cyprinus carpio carpio* Linnaeus, 1758) during the experiments

Experiment	Season	Allometric Condition Factor, K' (variable b coefficient)		Allometric Condition Factor, K'' (constant b coefficient)	
		Range	Statistical differences (T-Student test)	Range	Statistical differences (T-Student test)
Exp. 1	Autumn	1,5–3,0	$P < 0.05$	1,2–2,4	$P < 0.05$
	Spring	1,7–1,9		1,5–2,3	
Exp. 2	Autumn	2,3–3,2	$P < 0.05$	1,5–2,1	$P < 0.05$
	Spring	0,8–1,5		1,1–2,0	
Exp. 3	Autumn	3,7–5,9	$P < 0.05$	3,9–6,2	$P < 0.05$
	Spring	2,2–3,3		3,5–5,4	

Tab. 8: Allometric Condition Factor (variable and constant b coefficients both) and statistical comparisons ($P < 0,05$, t -Student test) between the samples collected in autumn and spring in grass carp, *Ctenopharyngodon idella* (Valenciennes, 1844) during the experiments

Experiment	Season	Allometric Condition Factor, K' (variable b coefficient)		Allometric Condition Factor, K'' (constant b coefficient)	
		Range	Statistical differences (T-Student test)	Range	Statistical differences (T-Student test)
Exp. 1	Autumn	1,8–2,1	$P < 0.05$	1,4–1,7	$P < 0.05$
	Spring	1,5–2,1		1,2–1,8	
Exp. 2	Autumn	2,4–3,2	$P < 0.05$	2,8–3,7	$P < 0.05$
	Spring	1,4–2,1		2,0–3,0	
Exp. 3	Autumn	–	–	–	–
	Spring	–		–	

Tab. 9: Allometric Condition Factor (variable and constant b coefficients both) and statistically comparisons ($P < 0,05$, t -Student test) between the samples collected in autumn and spring in silver carp *Hypophthalmichthys molitrix* (Valenciennes, 1844) during the experiments

Experiment	Season	Allometric Condition Factor, K' (variable b coefficient)		Allometric Condition Factor, K'' (constant b coefficient)	
		Range	Statistical differences (T-Student test)	Range	Statistical differences (T-Student test)
Exp. 1	Autumn	1,6–2,2	$P < 0.05$	1,8–2,3	$P < 0.05$
	Spring	1,3–2,5		1,2–2,4	
Exp. 2	Autumn	2,7–4,5	$P < 0.05$	3,8–6,3	$P < 0.05$
	Spring	1,4–1,9		3,4–5,0	
Exp. 3	Autumn	1,6–2,9	$P < 0.05$	3,3–6,2	$P < 0.05$
	Spring	0,9–1,3		3,2–5,3	

Tab. 10: Allometric Condition Factor (variable and constant b coefficients both) and statistically comparisons ($P < 0,05$, t -Student test) between the samples collected in autumn and spring in bighead carp *Aristichthys nobilis* (Richardson, 1845) during the experiments

Experiment	Season	Allometric Condition Factor, K' (variable b coefficient)		Allometric Condition Factor, K'' (constant b coefficient)	
		Range	Statistical differences (T-Student test)	Range	Statistical differences (T-Student test)
Exp. 1	Autumn	1,6–2,3	$P < 0.05$	1,8–2,5	$P < 0.05$
	Spring	1,0–2,1		1,0–2,2	
Exp. 2	Autumn	–		–	
	Spring	0,6–1,3		0,6–1,3	
Exp. 3	Autumn	2,7–3,7	$P < 0.05$	2,3–3,0	d.n.
	Spring	0,9–1,4		2,1–3,1	

The fish sampled before and after cold season show statistically significant differences ($P < 0.05$) that are in connection with depreciation of condition state during the wintering.

The average values and also the minim, maxim and quartile range (25–75%) for K' (with variable b coefficient) and K'' (with constant b coefficient) are shown in figure 2, 3, 4, 5, 6, 7.

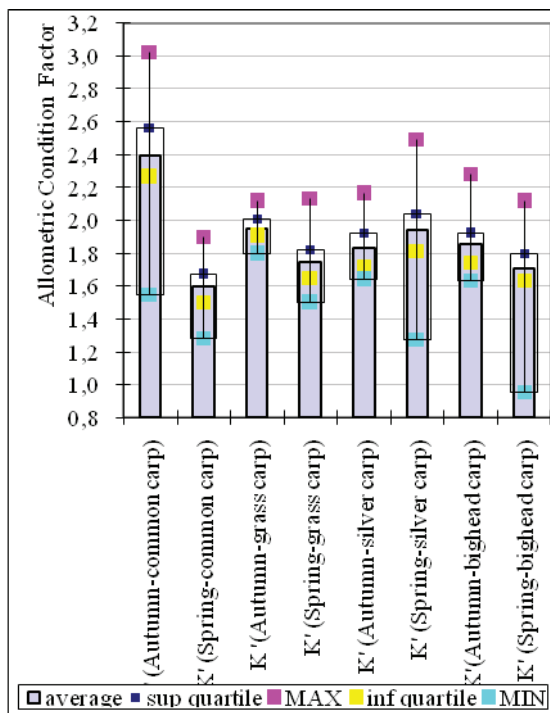


Fig. 2: The variation of Allometric Condition Factor (variable b coefficient) in reared juvenile cyprinids species during on experiment no 1 (Brates station)

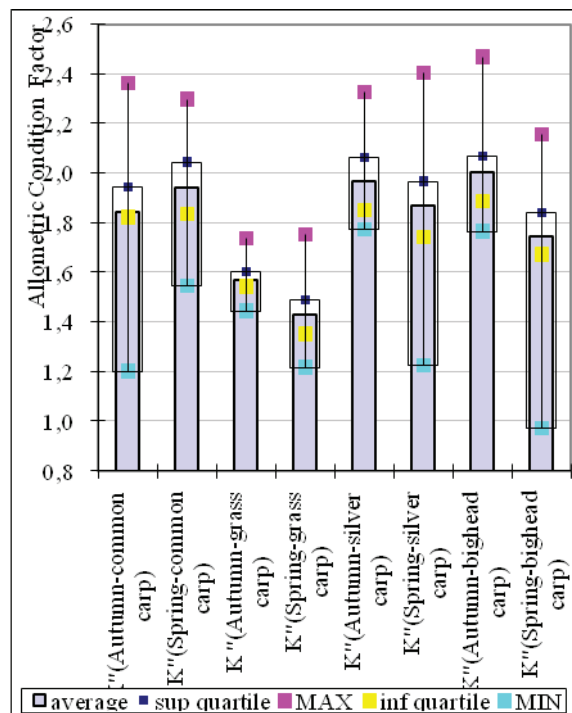


Fig. 3: The variation of Allometric Condition Factor (constant b coefficient) in reared juvenile cyprinids species during on experiment no 1 (Brates station)

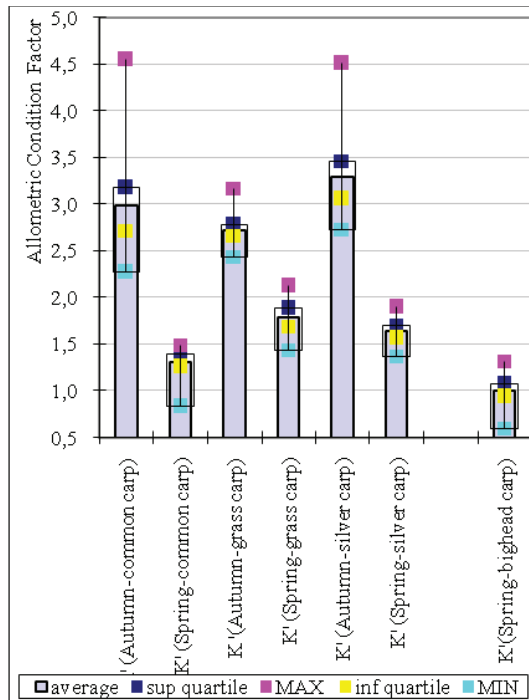


Fig. 4: The variation of Allometric Condition Factor (variable b coefficient) in reared juvenile cyprinids species during on experiment no2 (Brates station)

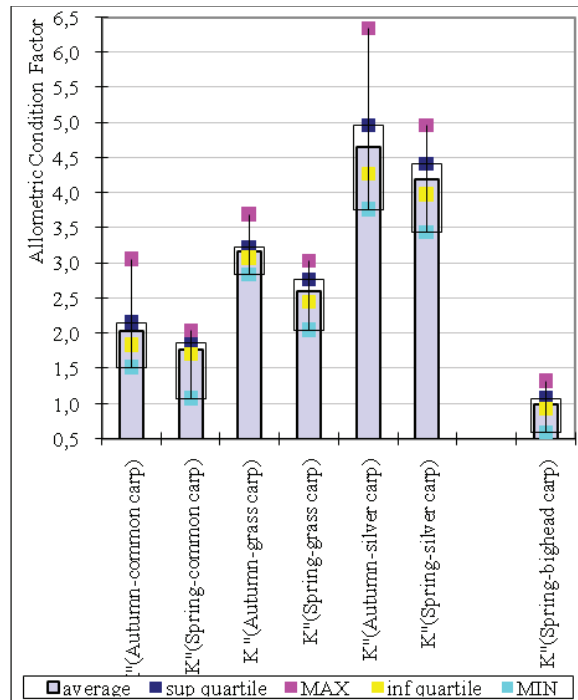


Fig. 5: The variation of Allometric Condition Factor (constant b coefficient) in reared juvenile cyprinids species during on experiment no 2 (Brates station)

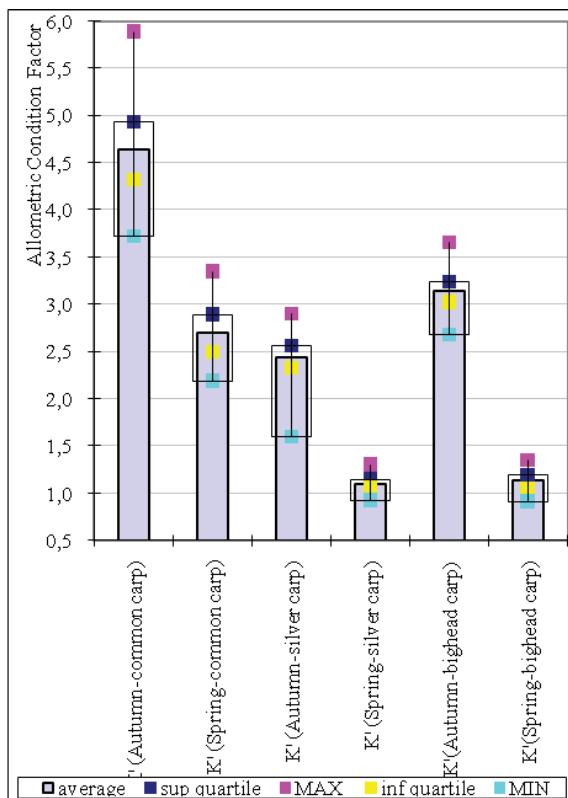


Fig. 6: The variation of Allometric Condition Factor (variable b coefficient) in reared juvenile cyprinids species during on experiment no 3 (Vladesti station)

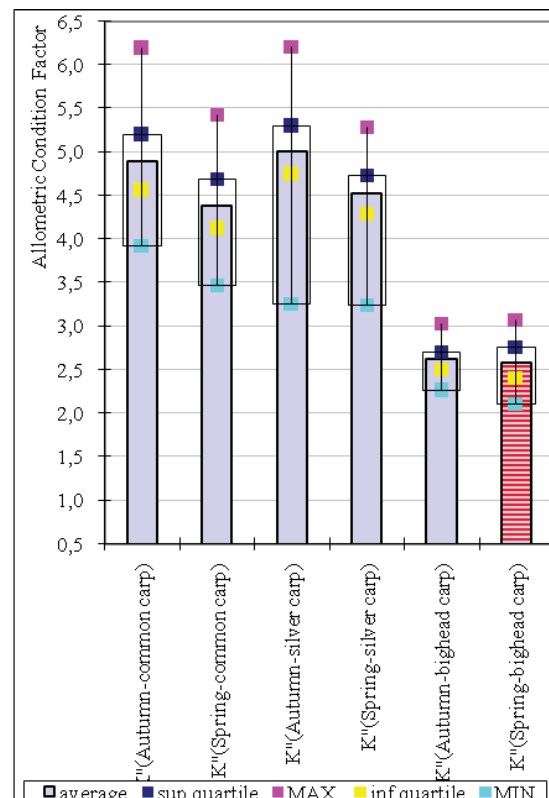


Fig. 7: The variation of Allometric Condition Factor (constant b coefficient) in reared juvenile cyprinids species during on experiment no 3 (Vladesti station)

Legend  not statistically significant differences ($P > 0.05$).

The Allometric Condition Factor of fish sampled during the autumn shows a positive ($b > 3.0$) and negative ($b < 3.0$) allometric growing both (Table 5) and a variability of weight/length relationship as default, in relation with the species, sampling station, experiment. The weight/length relationship assessed at the beginning of the wintering depends on the availability of the trophic resources during the vegetative season that allow a length grow of juvenile during summer and the accumulation of the energetic reserve during the autumn required for an optimal strength during the winter. In all four fish species sampled in Vlădeşti ponds at the beginning of the two winter seasons it notes a length increasing that is not proportional with the weight growing.

Although the samples within each experiment (at the beginning and the end of cold season) are obtained by random drawing from the same population, the weight/length relationship which undergoes changes during the winter, will be distorted by the influence of some typical factors to fish farms such as high fish stocking into the ponds, interspecific fish relationships and specific hibernation behaviour, low temperature, water chemical parameters etc.

Having in view these aspects, it can be noted the results obtained by Fulton Factor calculation using the variable b coefficient have a higher relevance allowing a correct assessment of weight/length relationship, condition state of fish and the modification degree of its, the environment and anthropic factors impact. The similar results obtained by other authors [1, 4].

There are some researches [2, 3, 9, 14] considering the constant b coefficient (calculated from a unique assemblage that links all the individuals, with a constant value for all subsamples collected in distinct seasons) as the most convenient procedure for studying fish Condition Factor.

Conclusions

The environment factors that influence the fish stocked into the winter ponds were differed during the experiments. Their combined action produces a concurrence of stress responses in fish (Winter Stress Syndrome) with different amplitudes and significations.

The Fulton Factor (as expression of general condition state) reached in autumn varied from one species to another and also from one cold season to another during the experiments.

An alteration of the condition state during the wintering has been observed in all four cyprinids species and all three experimental variants.

The differences between the Fulton Factor values arrays calculated for individuals sampled at the beginning and the end of cold season are statistically significant ($P < 0.05$). The amplitude of modifications depends on fattening state of fish reached in autumn and also wintering conditions.

Under some circumstances: a certain deposit of debris into the pond, a satisfactory fattening state reached in autumn, the silver carp with an average level of Condition Factor of $K = 1.5$ uses this available trophic source even under severe winter conditions and this fact could induce statistically not significant changes during the winter ($P = 0.26$, $P > 0.05$). No special numerical losses were recorded but only physiological alterations and weight loss.

The general tendency of condition state alteration is the more so as increases the time of fish stocking into the pond during on spring.

By applying the two methods of Allometric Condition Factor, the results obtained by index calculation using the variable b coefficient have a higher relevance allowing a correct assessment of weight/length relationship, condition state of fish and the modification degree of its, the environment and anthropic factors impact.

BIBLIOGRAPHY

1. Andrian, I., F., Barbieri, G., 1992, Determination of total weight and allometric condition factor of cangati, *Parauchenipterus galeatus* Linnaeus, 1766 (Siluriformes) from Itaipu reservoir, *Pr. Unimar*, Maringa, **14**: 177–191.
2. Antoniutti, D., M. et. al., 1985, Morfologia das gônadas, escala de maturidade e fator de condição de *Plecostomus albopunctatus* Regan, 1908 (Osteichthyes, Loricariidae) do Rio Jaguari, *Bol. do Inst. de Pesc.*, Sao, Paulo, **12** (4): 87–103.
3. Barbieri, G., Verani, J., R., 1987, The condition factor as indicator of maturation in *Hypostomus plecostomus* (Linnaeus, 1758) (Osteichthyes, Loricariidae), *Cien. Cult.*, Sao Paulo, **39** (7): 655–658.
4. Björnsson, B.T., Thorarensen, H., Hirano, T., Ogasawara, T. and Kristinsson, J.B., 1989, Photoperiod and temperature affect plasma growth hormone levels, growth, condition factor and hyposmoregulatory ability of juvenile Atlantic salmon (*Salmo salar*) during parr smolt transformation, *Aquaculture*, vol. **82**: 77–91.
5. Camara, J., J., C. et. al., 1993, Feeding dynamics in *Moenkhausia intermedia* Eigenmann, 1908 (Pisces, Characidae), *Bo. Intit. Pesc.*, Sao Paulo, **20**: 81–85.
6. Georgescu, R., Păltânea, E., Trofimov, A., 1991, *Aprecierea stării de întreținere a materialului piscicol de o vară la ferma piscicolă Brateș*, Simpoz. “Piscicultura și pescuitul în fața economiei de piață”, Galați: **53–55**.
7. Gheracopol, O., 1971, *Influența iernatului în heleșteie asupra unor caractere morfologie și biochimice ale crapului de cultură*, Teză de doctorat.
8. Le Cren, E. D., 1951, The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*), *Journal of Animal Ecology*: **20**: 201–219.
9. Lima, S., E., Cardone, I., B., Goitein, R., 2002, Determination of a method for calculation of Allometric Condition Factor of fish, *Acta Scientiarum*, Maringa, **24**, (2): 397–400.
10. Love, R.M., 1970, *The chemical Biology of Fishes*, Academic Press, London.
11. Morey, G., Moranta, J., Massuti, E., Grau, A., 2003, Weight – length relationships of littoral to lower slope fishes from weester Mediterranean, *Fisheries Res.*, **62** (1): 89–96.
12. Myers, M., S., Fournie, J., W., 2002, *Histopathological biomarkers as integrators of anthropogenic and environmental stressors*, American Fisheries Society, Bethesda: 221–288.
13. Nikolski, G. V., 1962, *Ecologia peștilor*, Acad.R.P.R., București.
14. Stergiou, K., I., 1993, Abundance – depth relationship, condition factor and adaptive value of zooplanktophagy for red bandfish, *Cepola macrophthalmia*, *J.Fish.Biol.*, Southampton, **42**: 645–660.
15. Sutton, S. G., Bult, T. P., Haedrich, R.L., 2000, *Relationships among fat weight, body weight, water weight, and condition factors in wild Atlantic salmon parr*, Transactions of the American Fisheries Society, **129**: 527–538.
16. Vasile-Șerbănescu, A., Marinescu, Al., G., Vizitiu, D., 1997, Modificarea compoziției chimice și scăderea în greutate la puietul de crap sub influența perioadei de iernat, *St.Cerc.Biol., seria biologie animală*, **49**(2): 165–185.

APLICAREA METODEI FACTORULUI ALOMETRIC DE CONDIȚIE ÎN STUDIUL INFLUENȚEI FACTORILOR DE IERNAT ASUPRA STĂRII DE ÎNTREȚINERE A PUIETULUI CIPRINIDELOR DE CULTURĂ (Rezumat)

O gamă variată de factori, care pot fi naturali – fizici, chimici, biologici, caracteristici sezonului rece, variațiilor nictemerale – sau antropici, cum ar fi cei legați de manipulările peștilor, succesiunea diferitelor operații tehnologice – influențează starea fiziologică a peștilor la nivel individual, iar efectele lor pot fi cuantificate prin mai mulți biomarkeri, la diferite niveluri ale organizării biologice.

Factorul de condiție Fulton este deseori utilizat ca un index pentru studiul biologiei peștilor, precum și în piscicultură, relația dintre lungime și greutate conținând informații referitoare la starea de întreținere a peștilor. Orice presiune din mediul ambiant poate afecta starea generală de sănătate a peștilor și condiția lor. De aceea, K poate fi utilizat ca un biomarker integrativ, care încorporează atât factorii limitativi mediali cât și pe cei antropici.

Nu există, până în prezent, un model unitar privind relația de calcul al factorului de condiție. Numeroși autori fac referință la înlocuirea metodei factorului Fulton prin relația $K = W/L^3$, aceasta nepermițând compararea rezultatelor obținute pe indivizi cu lungimi diferite, exponentul 3 nefiind o reprezentare reală a relației masă/lungime pentru majoritatea speciilor de pești, deoarece starea de condiție a peștilor prezintă variații în funcție de lungimea lor, robustețea corpului. Ca și variantă alternativă, majoritatea autorilor citați propun metoda regresiei masă/lungime și calculul factorului alometric de condiție, exprimat prin relația $K = W/L^b$.

În prezenta lucrare au fost analizate perturbările cauzate de procedeele diferite de calcul al coeficientului b , pe probele extrase pe durata experimentală.

Rezultatele obținute prin calculul coeficientului Fulton cu ajutorul factorului alometric b sezonier, au o mai mare relevanță, permițând o apreciere directă a relației de proporționalitate între creșterea în lungime și creșterea masei corporale și indirect, a stării de întreținere a peștilor, a gradului de modificare a acesteia, a impactului factorilor mediali și antropici.

NEW DATA ABOUT (COLEOPTERA: SCARABAEOIDEA: SCARABAEIDAE) FROM THE CONTINENTAL ZONE OF DOBROGEA

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Abstract: This work wants to bring a substantial contribution to the effort of studying the coleopteras from the subfamily Cetoniinae from the continental zone of Dobrogea. The author made in this purpose two journeys of collecting at the end of May and middle of June 2010 in Dobrogea, collecting with the aid of arboreal traps and directly, after observation on field lots of coleopteras including cetoniinae. After the effort of collecting, proceeded in Măcin Mountain, Babadag plateau and Oltinei plateau, a rich material had been collected made from 305 individuals which belong to 8 species. From these, *Cetonischema aeruginosa*, *Eupotosia fieberi* and *Eupotosia affinis* had been collected only in traps, speaking of ecogeographic arboreal elements, with a doubtless preference for tall arboreal canopy, in this case oak. They emigrated during the forest penetration, in the humid subperiod of the postglacial period [7]. From the rest of 5 species, *Netocia hungarica* and *Netocia vidua* had been collected only directly, from the stalks and inflorescences of plants, being eremial elements, immigrated once with the expansion of prairie. The *Netocia vidua* species reaches in Măcinului mountain the most Nordic point of its spreading complex. In the project are reported numerous forms of color, aberrations at *Cetonia aurata*, *Potosia cuprea cuprina* and one at *Cetonischema aeruginosa*. The distribution of cetoniinae species in every trap and then in general, on whole set of traps is presented, observing the predominant of south elements, of Balkan and Mediterranean origin in the collecting point of Oltinei plateau.

Keywords: cetoniinae, collecting, arboreal traps.

Introduction

This work represents the result of collectings in Dobrogea in summer 2010, when with the opportunity of two investigations had been collected lots of coleopteras, including a rich material containing cetoniinae. The aim of the investigations was to bring new data about the dobrogean fauna of coleopteras from Cetoniinae subfamily. The few works published until now give us a brief image about them. There are reported very few collecting points and the considerations about color variations and the waist of the insects or their habitat are also very few.

Better known is the Entomofauna near the shore, of course because of the relatively easy access along the coast of Black Sea. In the interior zone, Dobrogea, with few exceptions remain unknown.

Cetoniins are coleoptera insects of medium and big waist. Some of the exotic african species, ex. *Goliathus goliathus* and *Goliathus regius*, are one of the biggest coleopteras ever known, with total length of body up to 113 mm.

Cetoniins are part of the big group of coleopteras from Scarabaeidae family which differ from other subfamilies through the border lateral of elytra sinuate. The metasternum also has a median, flat and wide or round anterior extension at the apical part. The dorsal color of the body, more or less shiny, metallic, including the species from Romania, is rarely black (Fig. 9).

Materials and method

The collecting of materials was made in 22–26.05.2010 – first investigation and 15–19.06.2010 – second investigation.

They had been chose three points of collecting: 1. North Dobrogea: Măcinului mountain – on Taița valley, loc. Cetățuia and Greci peak, 467 m. 2. Central Dobrogea: Babadag plateau – Bujoarelor hill, 3 km north of Atmagea village, 3. South Dobrogea: Oltinei plateau – in Esechioi forest, Băneasa-Canaraua Fetei.

A lack of studies about cetoniinae until relative recently was constituted by the unknowing of efficient collecting methods. After introducing the widespread use of arboreal traps with fermented fruit baits, like new experimented combinations, and synthetic pheromones, the approaching of this group which belongs to the scarabaeidae family is easier.

There were placed 7 arboreal traps for collecting cetoniinae (2 were lost). Two of this were placed in Măcinului mountain near Cetățuia town, two in Babadag plateau, near Atmagea (one was lost), and the last three in Esechioi forest, near Esechioi village (one was lost). Location was made in the canopy of oaks at a 4–6 m height, in relatively sunny areas (forest edge), which favors the fermentation of sweet juice and attracts insects. Their placement had been made at the end of may, when begins the maximum period of flight at insects. It was used as a bait a composition made of wine, sugar, bananas with form of rings and salt, last for conservation.

Checking the traps was made after about 3 weeks, during the second investigation. Besides flower chafers, it had been collected an apreciable number of cerambycidae, but also a small number of coleopteras insects belonging to other families. A part of flower chafers were collected directly on field, after the inspection of stalks and inflorescences of herbaceous plants, especially *Carduus* sp. and *Cirsium* sp. The killing of alive insects was made in acetic ether and their safe keeping in 70% alcohol. It had also been collected an important material of cerambycidae coleopteras, buprestidae, carabidae, and from scarabaeidae in general. It was made an appreciable number of photos of the habitats in which these coleopteras live, including insects found in their living environment.

Results and discussion:

Collection points: 1. North Dobrogea: Măcinului mountain – on Taița valley, loc. Cetățuia and Greci peak, 467 m. The habitat characteristics are the thermophillic and submediteranean forests of oak, turkey oak forests, lime, oriental hornbeam from Dobrogea, both widespread on the eastern slope, while on the ridge appears a mosaic of forests and steppe in which alternates the moesian forests of downy oak, pontic grey of tukey oak (Fig. 1) and rocky steppe grassland.

2. Central Dobrogea: Babadag plateau – Bujoarelor hill, 3 km north of Atmagea village. The arrangement of forest on the south slope of Bujoarelor hill, is formed of thermophile species of turkey oak, hornbeam, lime, downy oak and flowering ash. In spring, in steppe stitches are blooming abundant forest peonies, *Paeonia peregrina* (Fig. 2).

3. South Dobrogea: Oltinei plateau, Esechioi forest. Xerophile oaks forest: downy oaks, turkey oak (forming compact groups), italian oak and oriental hornbeam (Fig. 3). The forest

contains lots of south elements: Balkan and Mediterranean. In glades and on rocky from the Ceairului valley area, Balkan shrubs are growing, like *Cotinus coggyria*.

The list of coleopteras from Cetoniinae subfamily reported in Continental Dobrogea:

Cetonia aurata (Linne, 1761)

Material: Măcinului mountain – 87 ex. from this, 79 are common. Four presents dorsal part with: head, pronotum and scutellum violet, green shades and the ventral part colored in dark green – ab. *tunicata* (Fig. 4a). One with green dorsal. Three with purplish bronze dorsal, ab. *amasicola* (Fig. 4b). More exemplars from ab. *tunicata* had been found on flowers of *Crataegus* sp. and *Sambucus* sp. (Fig. 4,c) on Chetrosul Mic top.

Bujoarelor hill forest – 33 exemplars. 30 are common, 3 ab. *tunicata*, with the color of the abdomen green-olive.

Esechioi forest – 7 exemplars, common, typical form.

Mentions in the literature: Canaraua Fetei, ab. *tunicata* [4].

General distribution: European. Ecological status: Common.

Potosia (Cetonischema) aeruginosa (Drury, 1770),

Material: Măcinului mountain – 5 ex. Bujoarelor hill forest – 6 ex. Esechioi forest – 1 ex.

Total collected exemplars: 12. Observations: common aspect, in general. At the exemplar from Esechioi the dorsal is light red, ab. *aureocuprea* (Fig. 5). All exemplars had been collected in traps.

Mentions in the literature: Dobrogea [3].

General distribution: Occidental and Central Europe. Ecological status: Local common.

Potosia (Eupotosia) affinis (Andersch, 1797)

Material: Măcinului mountain – is missing from our collecting. Bujoarelor hill forest – 4 ex, typical spect. Esechioi forest – 13 ex. At some exemplars the dorsal color is green with light brown irizations. Ventral color green with blue irizations.

Mentions in the literature: Măcin [1].

General distribution: Mediterranean. Ecological status: Local common.

Potosia cuprea cuprina (Motschulski, 1849)

Material: Măcinului mountain – 7 ex. Amber red color on dorsal part, oily sheen, ventral – purplish blue. Typical aspect (Fig. 6a). Bujoarelor hill forest – 29 ex. From this, 27 amber red color on dorsal part, with green irizations. Ventral, purplish blue. Typical aspect. Two of the exemplars present green irizations on the ventral part, including the legs.

Esechioi forest – 30 ex. 17 exemplars green on dorsal part (Fig. 6b), purplish blue on ventral part. 13 exemplars amber red on dorsal part, some of them dark cooper colored (Fig. 6c), others light cooper (Fig. 6d). Between them, 6 with green irizations on abdomen. At this lot can be observed the biggest color variations, and in terms of the pear designed white spots, they are situated on dorsal part of body – pronotum, elytras, pigidium.

More exemplars had been found in the glades of forests, on *Carduus* sp. inflorescences and in the pasture from forest neighborhood.

Mentions in the literature: Esechioi and Baș-Punar [4].

General distribution: Oriental Europe, Minor Asia, Middle East. Ecological status: Common.

Potosia (Eupotosia) fieberi (Kraatz, 1889)

Material: Măcinului mountain – 44 ex. Bujoarelor hill forest – 12 ex. Esechioi forest – 3 ex. For Transylvania often appears in association with *Potosia cuprea metallica* on diverse white inflorescences of the shrubs [2].

Mentions in the literature: Măcin [5].

General distribution: Central Europe (avoid Mediterranean areas). Ecological status: Local common.

Netocia hungarica (Herbst, 1790)

Material: Măcinului mountain, Greci top – 1 ex. on *Carduus* sp. stalks (Fig. 7). Pasture near Esechioi forest – 2 ex. on tall thistle stems. The *Netocia hungarica* larva develop in the ground squirrel nests blanket [4], but also on *Cirsium* sp. roots. Eremial element, the adult feeds himself with the young stems juice like *Cirsium* sp., *Carduus* sp., etc., which can be met on plants, in most dry and high places. The dorsal color and drawing formed of patches of white hairs is variable (Fig. 8).

Mentions in the literature: Bas Punar and Esechioi [4].

General distribution: Turano-european. Ecological status: Rare.

Netocia vidua (Gory & Percheron, 1883)

Material: Măcin mountain, Greci top – 21 ex. on inflorescence and on thistle strains (Fig. 9).

Mentions in the literature: Măcin [4]. Also exist alerts form zone: Mangalia [4], Albești [7] – in Dobrogea Maritime where climbs from Bulgaria, along the shoreline. The specie was frequently found by us on the high cliff from Balcic – BG. Măcin mountains represent the most northern point of geographic area of the specie.

General distribution: Mezasiatic. Ecological status: Rare.

Tropinota squalida (Scopoli, 1883)

Mentions in the literature: In littoral zone of Dobrogea, in Constanța [3].

General distribution: Mediterranean-endemic. Ecological status: Rare

Her existence in the continental area of Dobrogea is possible! It also exists an alert from Bucharest [5]. Also two alerts are from Oltenia.

Tropinota (Epicometis) hirta (Poda, 1761)

Material: Măcin mountains – 1 ex. in trap. Lots of exemplars were observed in spring on inflorescence of *Crataegus* sp. Flower insect. Eremial element.

Mentions in the literature Canaraua Fetei [5].

General distribution: Iranian-Mediterranean. Ecological status: Common.

Oxythyrea funesta (Poda, 1781)

Material: Măcin mountains. On Poverty Hill, 16. VI. 2010, were frequent observed exemplars on inflorescences of *Carduus* sp.

Mentions in the literature: Adamclisi, Cobadin, Iortomac, Canaraua Fetei [4].

General distribution: Maghreb-european. Ecological status: Common.

Oxythyrea cinctella (Schaum, 1841)

Literature: Iortomac [5], Băneasa [4]

General distribution: East Mediterranean. Occurrence: Rare.

Interpretation of obtained results after insect analysis found in the five traps.

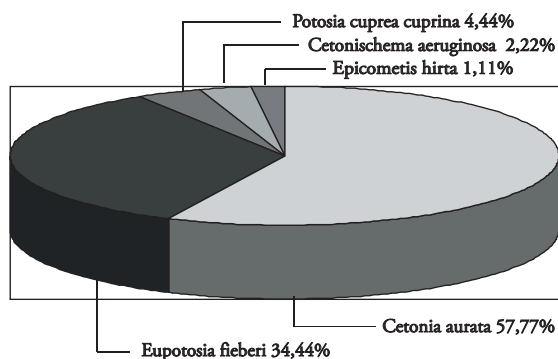


Fig. 10. Distribution of cetoniinae species collected in Măcin mountains, trap 1

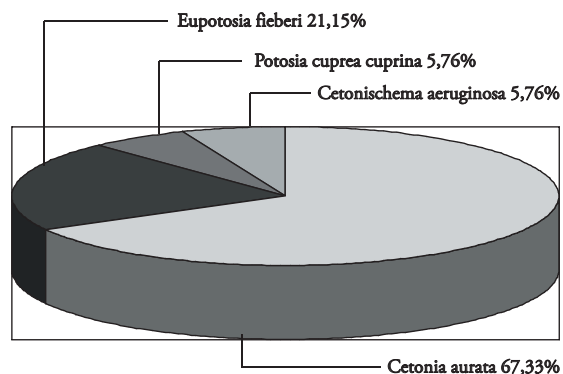


Fig. 11. Distribution of cetoniinae species collected in Măcin mountains, trap 2

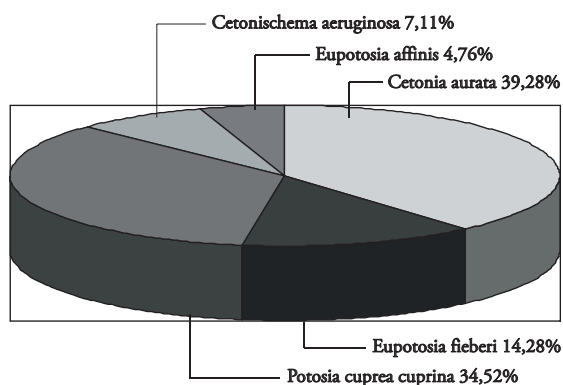


Fig. 12. Distribution of cetoniinae species collected in Babadag forest, trap 1

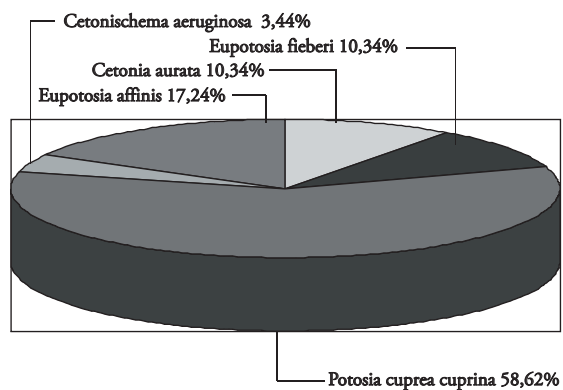


Fig. 13. Distribution of cetoniinae species collected in Esecchio forest, trap 1

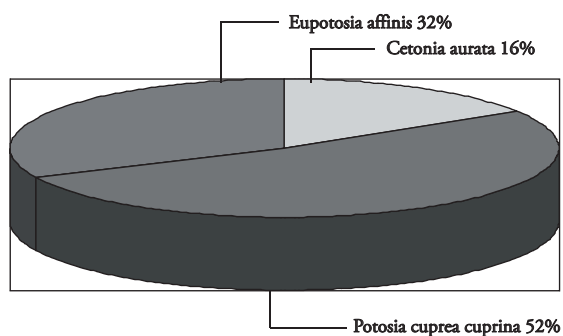


Fig. 14. Distribution of cetoniinae species collected in Esecchio forest, trap 2

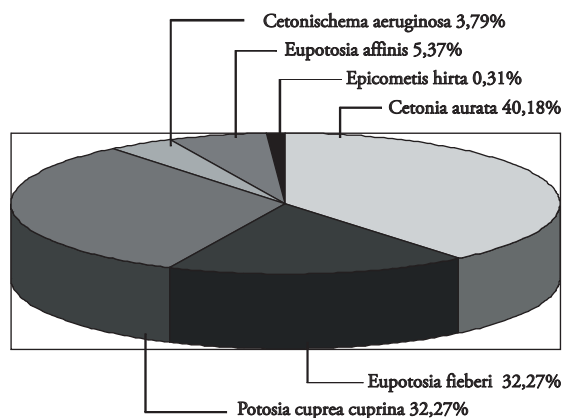


Fig. 15. General distribution of cetoniinae species in forests traps

After an analysis of the six cyclograms, the conclusion which I got to is that in the south of Dobrogea, at the border with Bulgaria, prevail the Oriental and Mediterranean elements, namely *Potosia cuprea cuprina* and *Eupotosia affinis*, with proportional reduction of European and Central European elements, like *Cetonia aurata* and *Eupotosia fieberi*. On the whole, analysing the last cyclogram, we conclude that in Dobrogea, in general, European elements are majority, with 72%.

Conclusions

The 10 coleoptera species from Cetoniinae subfamily alerted until today in fauna of Continental Dobrogea, reveals that this geographic area of Romania houses a diverse fauna in cetoniinae. Only *Liocola lugubris* species, north, sibero-european element, present in Romanian fauna, and doesn't appear in Dobrogea's fauna. *Tropinota squalida* was alerted until present only in the maritime area of Dobrogea.

On the other hand, the presence of four species, of Mediterranean origin: *Potosia affinis*, *Netocia vidua*, *Oxythyrea cinctella*, *Tropinota squalida*, like *Potosia cuprea cuprina* subspecies of south-european and oriental origin, reveals the particularity of climate, warmer and dryer than in other parts of the country, with Mediterranean influences. The rich material collected in summer 2010 includes representatives of 9 species of coleopteras cetoniinae, with many variations of form, color and disposition of hairs drawing on body. We alert for first time in Dobrogea fauna, *Cetonischema aeruginosa* specie with ab.*aureocuprea*.

Aknowledgements

The author wants to thank the administration of National Park of Macinului Mountains, personal to biologist Bogdan Băjenaru for granted support of lengh of the park visit.

BIBLIOGRAPHY

1. Fleck, E., 1904–1905, Die Coleopteren rümaniens. *Bul. Soc. Sci.*, **1–2**, **3–4**, **5–6**.
2. Istrate, P., & Chimişliu C., 2004, Contribuții la cunoașterea cetoniinelor (Coleoptera:Scarabaeoidea: Scarabaeidae) din Podișul Transilvaniei, România, *Drobeta, Seria Științele Naturii*, **XIV**, Drobeta Turnu Severin: 160–167.
3. Montandon, A., L., 1906, Notes sur la faune entomologique de Roumanie, *Bul. Soc. De Sc.*, București, **17**: 67–119.
4. Negru, Șt., & Roșca, A., 1967, Ord. Coleoptera, L' entomofaune des forêts du sud de la Dobroudja, *Trav. Mus. Hist. nat. "Grigore Antipa"*, București: 119–145.
5. Panin, S., 1957, *Familia Scarabaeidae, II*, Fauna R.P.R., Ed. Academiei Române, **10[4]**, București.
6. Ruicănescu, A., 1997, Coleoptere colectate în Parcurile Naționale Retezat și Valea Cernei, *Soc. lepid. rom*, Cluj-Napoca: 57–73.
7. Ruicănescu, A., 1999, Date asupra speciilor *Potosia* (s. str) *cuprea* (FABRICIUS, 1775), și *Netocia vidua* (GORY & PERCHERON, 1833) (Coleoptera: Scarabaeoidea: Cetoniidae) în fauna României. *Bul. inf. Soc. Lepid. rom.*, Cluj-Napoca, **10(1–2)**: 33–37.

**NOI DATE PRIVIND CETONIINELE (COLEOPTERA: SCARABAEOIDEA:
SCARABAEIDAE) DIN ZONA CONTINENTALĂ A DOBROGEI.
(Rezumat)**

Lucrarea dorește să aducă o contribuție substanțială la efortul de cunoaștere al coleopterelor din subfamilia Cetoniinae în zona continentală a Dobrogei. Autorul a efectuat în acest scop două călătorii de colectare la sfârșitul lunii mai și mijlocul lunii iunie 2010 în Dobrogea, colectând cu ajutorul capcanelor arboricole și direct, în urma observației în teren, numeroase coleoptere, inclusiv cetoniinae. În urma efortului de colectare, desfășurat în Munții Măcin, Podișul Babadag și Podișul Oltinei, s-a strâns un bogat material format din 305 indivizi, aparținând la 8 specii. Dintre acestea, *Cetonischema aeruginosa*, *Eupotosia fieberi* și *Eupotosia affinis* s-au colectat numai în capcane, fiind vorba de elemente ecogeografice arboreale, cu o preferință certă pentru coronamentul arborilor înalți, în speță stejari. Acestea au emigrat în timpul pătrunderii pădurilor, în subperioada umedă a perioadei postglaciare [6]. Din restul de 5 specii, *Netocia hungarica* și *Netocia vidua* s-au colectat numai direct, de pe tulpinile și inflorescențele plantelor, fiind elemente eremiale, imigrate odată cu extinderea stepei. Specia *Netocia vidua* ajunge în Munții Măcinului la cel mai nordic punct cunoscut al arealului său de răspândire. În lucrare sunt semnalate numeroase forme de culoare, aberații la *Cetonia aurata*, *Potosia cuprea cuprina* și una la *Cetonischema aeruginosa*. Distribuția speciilor de cetoniinae în fiecare capcană și apoi în general, pe întreg setul de capcane este prezentată, observându-se predominanța elementelor sudice, de origine balcanică și mediteraneană, în punctul de colectare din Podișul Oltinei.



Fig. 1: Main ridge of Măcin mountain with Moesian Woodland of downy oak and pontic groves of turkey oaks.



Fig. 2: Bujoarelor hill with mesh steppe in a thermophilous forest of turkey oak, downy oak, flowering ash, oriental hornbeam.



Fig. 3: Esechioi forest. Forest of thermophilous oaks: downy oak, turkey oak (which forms compact groups), italian oak and oriental hornbeam.



Fig. 4a: *Cetonia aurata* (Linne, 1761),
aberration tunicata



Fig. 4b: *Cetonia aurata* (Linne, 1761),
aberration amasicola



Fig. 4c: *Cetonia aurata* (Linne, 1761), aberration tunicata on flowers of *Sambucus* sp.



Fig. 5: *Cetonischema aeruginosa* (Drury, 1770),
aberration aureocuprea at collected
example from Esecchio forest.



Fig. 6a: *Potosia cuprea cuprina* (Motschulski, 1849),
typical form with amber-red
dorsal part, oily sheen.



Fig. 6b: *Potosia cuprea cuprina* (Motschulski, 1849), atypical
form, with green dorsal part,
oily sheen.



Fig. 6c: *Potosia cuprea cuprina* (Motschulski, 1849), atypical form, with dark amber dorsal part and variable drawing of hairs.



Fig. 6d: *Potosia cuprea cuprina* (Motschulski, 1849), atypical form with lit amber dorsal part.



Fig. 7: *Netocia hungarica* (Herbst, 1790).
Măcin mountain, Greci high.



Fig. 8: *Netocia hungarica* (Herbst, 1790).
Color and drawing variation formed of hairs
On dorsal part.



Fig. 9: *Netocia vidua* (Gory & Percheron, 1883). Greci high, Măcin mountain, exemplar found on inflorescence of *Carduus* sp.

RESEARCH ON THE CHRYSOMELIDAE (COLEOPTERA) FAMILY FROM THE UPPER BASIN OF THE MUREȘ RIVER WITH SPECIAL REFERENCE ON ITS NUTRITIONAL CHARACTERISTICS

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Abstract: The habitats within the upper basin of the Mureș River are rich in chrysomelid species. The majority of species are herbaceous, the forest species being less represented. The spread of chrysomelids within the researched area is directly influenced by the presence or absence of host plants, namely the degree of nutritional adaptation of the species. Thus, the most common species are the oligophagous and polyphagous, with a broad nutritive spectrum, while monophagous species are rare.

Keywords: upper basin of the Mureș River, chrysomelid species, nutritional characteristics.

Introduction

Chrysomelids are exclusively phytophagous coleopterans, some being extremely damaging to the crops. The present work comprises data regarding the correlation of chrysomelid species collected together with the host plant.

Materials and methods

Our research took place during the period 2005–2009 within the research area including a part of the Călimani, Gurghiu, Giurgeu massive mountains, the Gheorgheni depression, the Toplița – Deda pass and the nature reserves as well as the protected areas in 15 different habitat types of forest and grassland. Collections were made with the entomological net and the entomological umbrella by sweeping the herbaceous vegetation and by swaying the trees. The biological stuff was killed in 70% alcohol, kept dry in glass tubes. Measurements were made in the laboratory, by a binocular magnifier relying on the specialized works developed by the authors mentioned in the references [5, 6].

Results and discussions

8097 individuals were collected belonging to 227 species out of 10 subfamilies. The best represented subfamilies are the Halticinae with 104 species out of 17 genera, the Chrysomelinae with 52 species out of 15 genera, followed by the Chrysocephalinae with 27 species of two genera, the Cassidinae with 15 species out of a single genus, the Galerucinae with 11 species

and Clytrinae with 11 species out of 4 genera, the Criocerinae with 4 species out of 2 genera, respectively the Donaciinae, Zeugophorinae, Lamprosomatinae with one species each. The best represented subfamilies are the Halticinae with 104 species out of 17 genera, the Chrysomelinae with 52 species out of 15 genera while less represented are the Donaciinae, the Zeugophorinae and the Lamprosomatinae subfamilies. (Table 1)

Table 1: Distribution of the Chrysomelid species on subfamilies and type of nutrition

no.	Subfamily	No. of species	No. of forest species	% of the total	No. of grassland species	% of the total
1	Halticinae	104	10	9,61	94	90,38
2	Chrysomelinae	52	18	34,61	34	65,38
3	Chrysocephalinae	27	18	66,66	9	33,33
4	Cassidinae	15	–	–	15	100
5	Galerucinae	11	2	18,18	9	81,81
6	Clytrinae	11	7	63,63	4	36,36
7	Criocerinae	4	–	–	4	100
8	Donaciinae	1	–	–	1	100
9	Zeugophorinae	1	1	100	–	–
10	Lamprosomatinae	1	–	–	1	100
	Total	227	56		171	

As indicated in Table 1 the majority of species fall within the category of herbaceous, phytophagous grassland as it is the case of the representative subfamilies, like the Halticinae with 90.38%, respectively the Galerucinae with 81.81% and the Chrysomelinae with 65.38%. Depending on the number of host plants, on the nutritive spectrum the species fall into the monophagous, oligophagous, polyphagous categories. In case of the species from the Chrysomelidae family, I have processed the data on host plants relying on the existing literature [1,2,3,4,7,8,9,10,11]. After processing the data from the researched habitats it resulted that out of the total 227 species the predominant ones are the oligophagous with 124 species, followed by the polyphagous ones with 79 species while the fewest in number are the monophagous species with 24 species (Fig. 1).

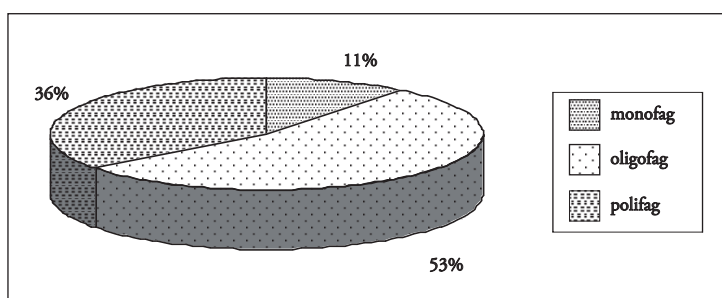


Fig. 1: Distribution in percentage of the chrysomelid species according to the type of nutrition

Within each nutritive category the subfamilies are distributed through differentiation. Thus, within the monophagous species the best represented are the Halticinae subfamily with its 12 species, followed by the Chrysomelinae subfamily with 6 species, the Chrysocephalinae subfamily with 3 species, the Galerucinae with 2 species and the Lamprosomatinae with one species (Fig. 2).

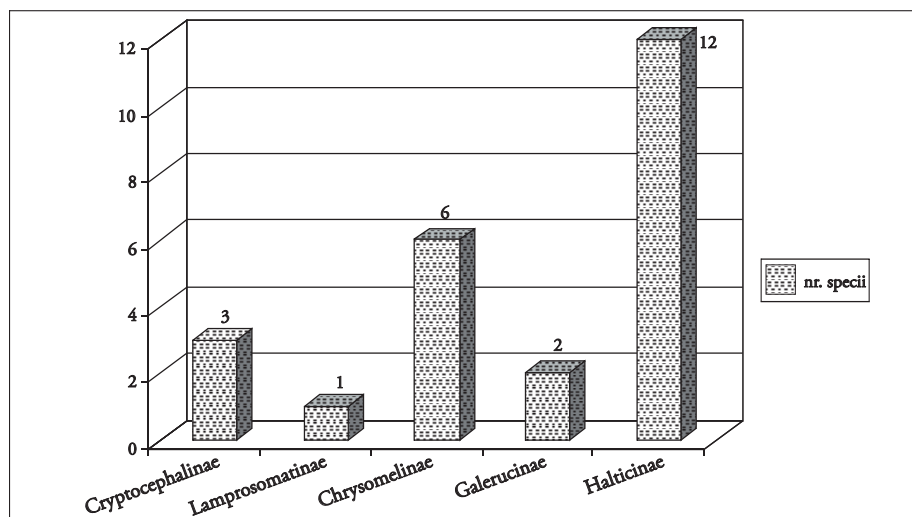


Fig. 2: Distribution of monophagous chrysomelide species on subfamilies

The oligophagous species, the most numerous ones, have nine subfamilies, thus except for the Donaciinae all subfamilies are represented with variable number of species. The best represented subfamilies are the Halticinae with 66 species, followed by the Chrysomelinae subfamily with 32 species, as well as the Cassidinae with 8 species, the Cryptocephalinae with 7 species, the Galerucinae and Criocerinae with 3 species, the Clythrinae with 2 species and the Lamprosomatinae and Zeugophorinae with one species each (Fig. 3).

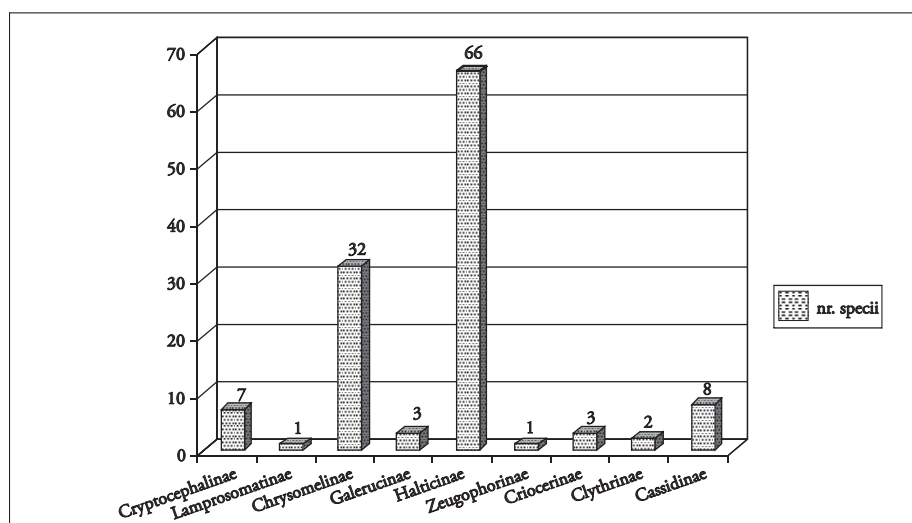


Fig. 3: Distribution of the oligophagous Chrysomelide species on subfamilies

The polyphagous species fall within all the ten subfamilies revealed by the research. The best represented subfamilies are the Halticinae with 25 species, followed by the Cryptocephalinae with 17 species, the Chrysomelinae with 13 species, the Clythrinae with 9 species, the Cassidinae with 7 species, the Galerucinae with 6 species and the Donaciinae, Zeugophorinae, Criocerinae and Lamprosomatinae with one species each (Fig. 4).

Conclusions

The species of the ten subfamilies present within the researched area are predominantly oligophagous, most preferring plants from the same family, followed by the polyphagous species, consuming plants from two or more families and the monophagous species preferring a single host plant.

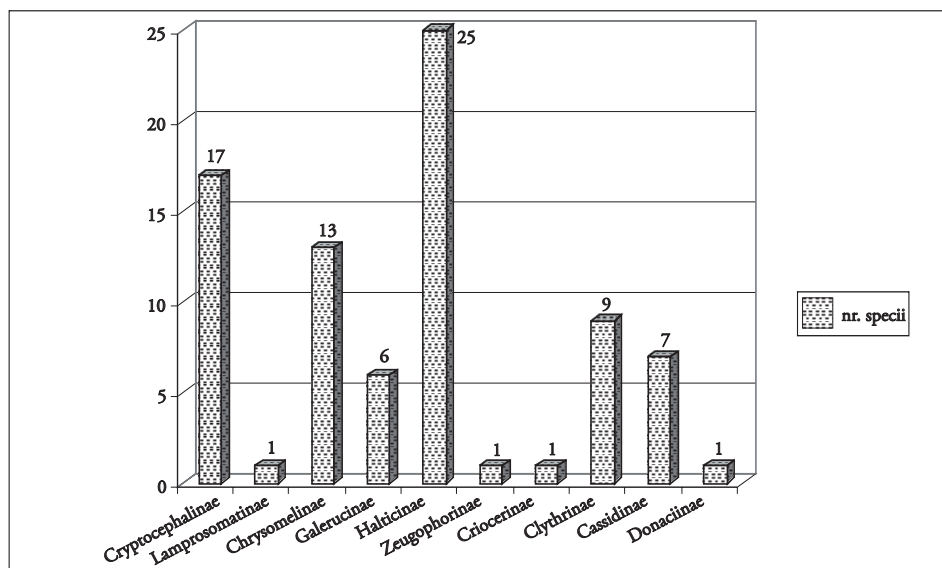


Fig. 4: Distribution of the polyphagous Chrysomelide species on subfamilies

REFERENCES

1. Jaquet, M., 1904, Faune de la Roumanie. Coléoptères récoltés par M. Jaquet et déterminés par M.E. Poncy, entomologiste à Genève., *Buletinul Societății de Științe, București*, **13** (1–2): 66–69.
2. Bielz, E. A., 1887, *Siebenbürgens Käferfauna*. – Verh. Mitt. Siebenbürg. Ver. Naturwiss. Hermannstadt, **37**: 74–80.
3. Csiki, E., 1942 a, Adatok a Görgényi hegység bogárfaunájának ismeretéhez, *Math. Term. tud. Közl*, **61**: 369–384.
4. Panin, S., 1944, Les Chrysomela de la Roumanie, *Bulletin de la Section Scientifique de l'Académie Roumaine*, **26** (9): 601–625.
5. Kaszab, Z., 1962, Levélbogarak – Chrysomelidae – In: *Magyarország Állatvilága (Fauna Hungariae)*, **IX**, 16. Akadémiai Kiadó, Budapest, 416 p.
6. Freude, H., Harde, K.W., Lohse G.A., 1966, Die Käfer Mitteleuropas. (Goeke & Evers,) Krefeld, **9**: 95–299
7. Rozner, I., 1996, An updated list of the Chrysomelidae of Hungary and the adjoining parts of the Carpathian Basin (Coleoptera), *Folia. Ent. Hung.*, **57**: 243–260.
8. Warchałowski, A., 2003, *Chrysomelidae. The leaf-beetles of Europe and the Mediterranean area*, Warszawa, 600 p.
9. Crișan A., Teodor L., 2005, Leaf beetle biodiversity in the low Arieș river basin (Chrysomelidae, Coleoptera, Insecta), *Entomol. rom.*, **10**: 43–52.
10. Crișan A., 2006, Comparative analysis of leaf-beetles (Coleoptera, Chrysomellidae) from the scientific reserve Scărița-Belioara, Cheile Turzii and Cheile Turului (Transylvania, Romania), *Studia Univ. "Babeș-Bolyai", Biol.*, **51**, 2, 3–1.
11. Maican, S., 2006, Chrysomelids (Coleoptera: Chrysomelidae) from the sylvosteppe forests of Romania, *Romanian Journal of Biology-Zoology*, Edit. Acad. Rom., **51** (1–2): 13–25.

CERCETĂRI ASUPRA FAMILIEI CHRYSOMELIDAE (COLEOPTERA) DIN BAZINUL SUPERIOR AL RÂULUI MUREȘ, CU REFERIRE SPECIALĂ ASUPRA CARACTERISTICILOR DE NUTRIȚIE (Rezumat)

În bazinul superior al Mureșului, habitatele sunt bogate în specii de crizomelide. Majoritatea speciilor sunt ierboase, speciile silvicole sunt mai puțin prezente. Răspândirea crizomelidelor în zona cercetată este direct influențată de prezența sau absența plantelor gazdă, respectiv de gradul de adaptare nutritivă a speciilor. Astfel, speciile cele mai frecvente sunt oligofage și polifage, cu spectru nutritiv mai larg, iar speciile monofage sunt rare.

COREOID BUGS OF “KIS BELA” COLLECTION PRESERVED IN TÂRGU-MUREȘ NATURAL SCIENCE MUSEUM (INSECTA: HETEROPTERA: COREOIDEA)

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Abstract: In this paper is presented the list of “Bela Kis” coreoid bugs collection which contains 271 specimens belonging to 40 species from 25 genera, conserved in the Târgu-Mureș Natural Science Museum.

Keywords: Heteroptera, Coreoidea, Natural Science Museum Târgu-Mureș

Introduction

Coreoids are insects to the suborder Heteroptera, a group of about 40,000 species of insects in the Hemiptera (approximately 3000 heteropterans in Europe). Their name refers to the forewings, which are differentiated into a thickened basal area and a membranous apical region (called hemelytra). The hindwings are entirely membranous. In Heteroptera the mouthparts are elongate and slender, forming a sucking mechanism.

Data on species belonging to the superfamily Coreoidea were published in our country since the second half of the nineteenth century. The data shown in the faunal lists on heteropterans from Dobrogea (published by G. HORVATH, AL MONTANDON, M. JAQUET, O. M. REUTER), Moldavia and Wallachia (A. L. MONTANDON), Transsylvania (G. HORVATH, Z. SZILADY, A. LORINCZ) and Banat (I. FIVALDSZKI) were synthesized by HORVATH in a study published in 1897.

In the early twentieth century Heteroptera is one of the most well-known groups of insects because of research conducted by HORVATH and MONTANDON. (B. KIS 1984).

Since 1950 the important works about this group were published by SIENKIEWICZ (1956–1964), NEGRU (1967, 1968), KIS (1972–2001), SCHNEIDER (1973, 1976).

Beetven 1955 and 1964 I. SIENKIEWICZ resumed the heteropteran study completing the knowledge of this insects group in Roumania.

BELA KIS who published the comprehensive treatises about the species of the super-families Pentatomoidea (1984), Coreoidea and Pyrrhocoroidea (2001), have a great contribution to the knowledge of the Romanian bug fauna.

Coreoid bugs have four-segmented antennae, a beak, distinct ocelli, and many veins in the membrane. Coreoid bugs are spread on all types of biotopes, but they prefer the sunny

biotopes which have lush xerophile vegetation. They are phytophagous heteropterans with a large spectrum of host plants, but in our region they do not cause damage to plants grown.

According to **The List of Romania's fauna** published in 2007 by the Institute of Speleology "Emil Racoviță", in our country are over 1,100 known species of Heteroptera.

Materials and methods

The present paper summarizes the coreoid bugs collection acquired in 1998 by Târgu-Mureș Natural Sciences Museum from the well known entomologist Kis Bela.

The collection refers to 271 coreoid specimens.

The specimens were collected and assigned by Bela Kis during 30 years of study of Romanian Heteroptera biodiversity. All this material is mounted on entomological pins and well preserved.

The biological material is labeled in alphabetical order. The work presents for each species of the collection the number of individuals, the sampling area, the date of samplings and their geographical spreading. The collecting sites are listed alphabetically.

The nomenclature of the coreoid species is according to Fauna Europaea's online database (Aukema 2010).

Results and discussions

Coreoids bugs belonging to "Bela Kis" collection preserved in the Natural Science Museum of Târgu-Mureș include 271 specimens that coming from 53 collection points in different parts of the country. Material pertaining to 40 species (72,71% of the entire amount of coreoidea in Romania), 25 genera and 4 families: Alydidae,

Coreidae, Rhopalidae and Stenocephalidae.

The paper complete the coreids distribution map in Romania.

The Rhopalidae family is represented in the collection by the largest number of genera (9) and by the most numerous species (19).

The Coreidae family is represented by 15 species belonging to 11 genera. The Alydidae and Stenocephalidae families are represented by 3 species. The collection includes all the species of Alydidae (3 species), 95% of Rhopalidae species, 75% of Stenocephalidae species and 51.72% of Coreidae species reported until now in our country's fauna.

The species: *Megalotomus junceus* (Scopoli 1763), *Arenocoris fallenii* (Schilling 1829), *Ceraleptus lividus* (Stein 1858), *Phyllomorpha laciniata* (Villers 1789), *Agraphopus lethierryi* Stål 1872, *Chorosoma gracile* Josifov 1968, *Leptoceraea viridis* Jakovlev 1873, *Maccevethus errans caucasicus* (Kolenati 1845), *Stictopleurus pictus* (Fieber 1861), *Stictopleurus subtomentosus* Rey 1888 and *Dicranocephalus medius* (Mulsant & Rey 1870) are rare in our country's fauna.

Lists of collecting sites

Agighiol (TL); Aiud (AB); Alba (TL); Arcalia (BN); Babadag (TL); Băile Herculane (CS); Bucovăț (DJ); Capul Iancina (TL); Caraorman (TL); Cluj-Napoca (CJ); Cinciș (HD); Cocoș Monastery (TL); Cozia Mts.; Craiova (Obedeanu) (DJ); Dăbuleni (DJ); Enisala (TL); Fânațele Clujului Botanical Reserve (CJ); Feneș (BH); Foeni (SM); Gura Văii (DJ); Hagieni Forest Natural Reserve (CT); Halmeu Vii (SM); Holod (BH); Intregalde (AB); Krivița valley (CS); Maliuc (TL); 6 Martie (TL); Murighiol (TL); Negrești (SM); Orșova (MH); Niculițel

(TL); Domogled – Valea Cernei National Park (CS); Periprava (TL); Predeal (BV); Prunet (DJ); Râmeţului Gorges (AB); Runcului Gorges (AB); Turzii Gorges (CJ); Săcăreni (MŞ); Scobâlţeni (IS); Semenice Mts.; Slatina (OT); Sovata (MŞ); Stana (SJ); Şimleu Silvaniei (SJ); Şoimuş (SJ); Someşul Rece (CJ); Tulcea ((TL); Turului Gorges (CJ); Valea lui Mihai (BH); Vălişoara (AB); Voineasa (VL); Uzlina ((TL)

Species list

Order HEMIPTERA Suborder HETEROPTERA Superfamily COREOIDEA

Family Alydidae

Alydus calcaratus (Linnaeus 1758)

Domogled 9.VIII.1983 (1 ex.); Valea lui Mihai 19.IX.1981 (2 ex.); Dăbuleni 26.VIII.1987 (1 ex.); 27.IX.1988 (1 ex.); Orşova 24.VI.1985 (1 ex.); Arcalia 6.X.1982 (2 ex.); Stana 19.IX.1981 (1 ex.); holarctic species

Camptopus lateralis (Germar 18179)

Dăbuleni 27.IX.1988 (2 ex.); Bucovăţ 8.VI.1980 (3 ex.); Sovata 20.VIII.1973 (2 ex.); Cluj-Napoca 24.VIII.1973 (2 ex.); mediterranean-central asian-indian species

Megalotomus junceus (Scopoli 1763)

Holod 24.VIII.1984 (1 ex.); european-central asian species

Family Coreidae

Arenocoris fallenii (Schilling 1829) *

Enisala 26.IX.1991 (1 ex.); 13.VIII.1992 (1 ex.); euromediterranean-anatolian species

Bathysolen nubilus (Fallen 1807)

Bucovăţ 25.IX.1988 (ex.); Orşova 24.VI.1985 (1 ex.); 15.V.1988 (1 ex.); Enisala 26.IX.1991 (1 ex.); Aiud 17.IX.1988 (1 ex.); Tureni Gorges 3.VI.1987 (2 ex.); Cluj-Napoca 27.VIII.1987 (1 ex.); 2.V.1987 (1 ex.); 12.IV.1988 (1 ex.); european-central asian species

Centrocoris spiniger (Fabricius 1781)

Hagieni Forest 22–28.VI.1991 (6 ex.); mediterranean-central asian species

Ceraleptus gracilicornis (Herrich-Schaeffer 1835)

Cocoş Monastery 4.VII.1985 (1 ex.); Bucovăţ 25.IX.1988 (1 ex.); Caraorman 5.VII.1991 (1 ex.); Orşova 24.VI.1989 (1 ex.); Babadag 18.VI.1991 (1 ex.); Hagieni 26.IV.1989 (1 ex.); 22.VI.1990 (1 ex.); Băile Herculane 18.V.1988 (1 ex.); 29.V.1990 (1 ex.); mediterranean species

Ceraleptus lividus (Stein 1858)

Enisala 19.V.1991 (2 ex.); european species

Coreus marginatus (Linnaeus 17589)

Scobâlţeni 20.IX.1986 (1 ex.); Maliuc 19.IX.1991 (1 ex.); Hagieni Forest 4.VIII.1980 (1 ex.); Someşul Rece 11.VII.1978 (3 ex.); 23.VI.1978 (1 ex.); palearctic species

Coriomeris denticulatus (Scopoli 1763)

Tulcea 10.VI.1982 (2 ex.); 6.IX.1983 (1 ex.); Enisala 19.V.1991 (1 ex.); Krivica valley 24.V.1990 (2 ex.); Orşova 22.V.1990 (2 ex.); Gura Văii 25.V.1990 (2 ex.); euromediterranean-central asian species

***Coriomeris hirticornis* (Fabricius 1794)**

6 Martie 10.V.1992 (1 ex.); Hagieni Forest 24.VI.1990 (1 ex.); Bucovăț 25.IX.1988 (1 ex.); holomediterranean species

***Coriomeris scabricornis* (Panzer 1809)**

Dăbuleni 27.IX.1988 (1 ex.); 6.VII.1989 (1 ex.); Bucovăț 9.VI.1980 (1 ex.); Valea lui Mihai 9.IX.1981 (1 ex.); eurosiberian species

***Enoplops scapha* (Fabricius 1794)**

Babadag 31.VIII.1976 (1 ex.); palearctic species

***Gonocerus acuteangulatus* (Goeze 1778)**

Cocoș Monastery 4.VI.1985 (2 ex.); Halmeu Vii 4.VI.1986 (2 ex.); Turzii Gorges (4 ex.); european-central asian species

***Gonocerus juniperi* Herrich-Schaeffer 1839**

Șoimuș 11.VIII.1976 (4 ex.); euroanatolian species

***Phyllomorpha laciniata* (Villers 1789) ***

Capul Iancina 2.V.1993 (1 ex.); holomediterranean species

***Spathocera lobata* (Herrich-Schaeffer 1840)**

Cocoș Monastery 4.VI.1985 (1 ex.); Băile Herculane 29.V.1990 (1 ex.); Bucovăț 12.V.1987 (1 ex.); 25.IX.1988 (1 ex.); mediterranean-central asian species

***Syromastus rhombeus* (Linnaeus 1758)**

Cocoș Monastery 4.VI.1985 (1 ex.); Bucovăț 9.VI.1980 (1 ex.); 6.IX.1984 (1 ex.); Hagieni Forest 4.VIII.1980 (3 ex.); 8.IX.1982 (1 ex.); Băile Herculane 29.V.1990 (1 ex.); Holod 24.VIII.1984 (1 ex.); euromediterranean-central asian species

Family Rhopalidae

***Agraphopus lethierryi* Stål 1872 ***

Caraorman 9.VIII.1984 (2 ex.); holomediterranean species

***Brachycarenum tigrinus* (Schilling 1829)**

Hagieni Forest 1.VII.1986 (1 ex.); 30.IV.1989 (1 ex.); Dăbuleni 28.IX.1988 (2 ex.); Enisala 20.V.1991 (2 ex.); Agighiol 1.V.1993 (2 ex.); Caraorman 21.IX.1991 (1 ex.); Periprava 12.VII.1987 (1 ex.); euromediterranean-central asian species

***Chorosoma gracile* Josifov 1968 ***

Dăbuleni 27.IX.1988 (1 ex.); Foeni 9.VII.1983 (2 ex.); euromediterranean-central asian species

***Chorosoma schillingi* (Schilling 1829)**

Caraorman 23.VIII.1992 (1 ex.); Periprava 4.VII.1990 (13 ex.); euromediterranean species

***Corizus hyoscyami* (Linnaeus 1758)**

Someșul Rece 23.VI.1975 (1 ex.); Slatina 2.VI.1979 (1 ex.); Hagieni Forest 3.VII.1986 (1 ex.); 30.IV.1989 (1 ex.); Băile Herculane 29.V.1990 (1 ex.); Periprava 10.VII.1987 (1 ex.); Intregalde 4.VIII.1982 (1 ex.); Negrești 1.VII.1983 (1 ex.); Tulcea 19.VI.1982 (1 ex.); Caraorman 7.VIII.1984 (1 ex.); palearctic species

***Leptoceraea viridis* Jakovlev 1873 ***

Caraorman 14.VIII.1984 (4 ex.); Distribution: Europe: Cyprus, Romania, Ukraine,

***Liorhyssus hyalinus* (Fabricius 1794)**

Murighiol 9.X.1984 (1 ex.); Periprava 10.VII.1987 (5 ex.); Caraorman 21.IX.1991 (1 ex.); Dăbuleni 18.VII.1988 (1 ex.); Uzlina 4.IX.1985 (2 ex.); cosmopolitan species

***Maccevethus errans caucasicus* (Kolenati 1845) ***

Gura Văii 25.V.1990 (1 ex.); Dăbuleni 28.X.1988 (2 ex.); pontomediterranean species

***Myrmus miriformis* (Fallen 1807)**

Tulcea 6.IX.1983 (1 ex.); Semenice Mts. 9.VIII.1981 (1 ex.); Domogled 11.VIII.1983 (1 ex.); Bucovăț 6.IX.1984 (1 ex.); Feneș 4.VIII.1984 (1 ex.); Alba 2.IX.1985 (1 ex.); Caraorman 12.VI.1982 (1 ex.); 11.VII.1985 (1 ex.); Șimleu-Silvaniei 25.VII.1979 (1 ex.); 21.VIII.1978 (1 ex.); eurosiberian species

***Rhopalus conspersus* (Fieber 1837)**

Cinciș 19.VII.1988 (1 ex.); Sovata 7.VIII.1986 (1 ex.); Cluj-Napoca 20.IX.1988 (1 ex.); Vălișoara 21.VII.1986 (3 ex.); Semenice Mts. 26.V.1988 (1 ex.); 1.VI.1988 (1 ex.); Tulcea 15.VII.1987 (2 ex.); euromediterranean-central asian species

***Rhopalus distinctus* (Signoret 1859)**

Cocoș Monastery 4.VI.1985 (1 ex.); Vălișoara 21.VII.1986 (1 ex.); Cinciș 19.VII.1988 (1 ex.); Alba 2.IX.1985 (1 ex.); Tulcea 8.VII.1990 (1 ex.); Orșova 24.VI.1985 (2 ex.); Enisala 26.IX.1991 (2 ex.); 8.V.1992 (1 ex.); euromediterranean species

***Rhopalus maculatus* (Fieber 1837)**

Maliuc 16.V.1991 (1 ex.); 7.VIII.1991 (1 ex.); 21.VIII.1992 (1 ex.); eurosiberian species

***Rhopalus parumpunctatus* (Schilling 1829)**

Krivica v. 26.VI.1985 (1 ex.); Caraorman 9.VIII.1984 (1 ex.); Cinciș 15.VII.1988 (1 ex.); Voineasa 24.VIII.1990 (1 ex.); Periprava 7.VII.1987 (1 ex.); Bucovăț 6.IX.1984 (1 ex.); Vălișoara 21.VII.1986 (2 ex.); Dăbuleni 7.V.1987 (1 ex.); 27.VIII.1987 (1 ex.); palearctic species

***Rhopalus subrufus* (Gmelin 1798)**

Predeal 11.VI.1987 (2 ex.); Săcăreni 15.VIII.1986 (1 ex.); Sovata 7.VIII.1986 (1 ex.); Babadag 15.VIII.1992 (1 ex.); 6 Martie 10.V.1992 (1 ex.); Băile Herculane 18.V.1988 (2 ex.); Enisala 26.IX.1991 (2 ex.); cosmopolitan species

***Stictopleurus abutilon* (Rossi 1790)**

Enisala 26.IX.1991 (1 ex.); Krivica v. 16.V.1988 (1 ex.); Maliuc 18.V.1992 (1 ex.); Caraorman 21.IX.1991 (1 ex.); Cozia Mts. 14.V.1987 (1 ex.); Niculițel 10.VI.1985 (1 ex.); Periprava 12.VII.1987 (1 ex.); Alba 2.IX.1985 (1 ex.); Agighiol 1.V.1993 (2 ex.); eurosiberian-mediterranean species

***Stictopleurus crassicornis* (Linnaeus 1758)**

Sovata 7.VIII.1986 (1 ex.); Runcului Gorges 22.IX.1992 (3 ex.); Enisala 20.V.1991 (1 ex.); Bucovăț 6.IX.1984 (1 ex.); Râmeșului Gorges 7.V.1985 (1 ex.); Maliuc 18.V.1992 (1 ex.); Vălișoara 21.VII.1986 (1 ex.); Stana 12.X.1988 (1 ex.); eurosiberian species

***Stictopleurus pictus* (Fieber 1861) ***

Bucovăț 6.IX.1984 (1 ex.); euromediterranean-central asian species

***Stictopleurus punctatonevrosus* (Goeze 1778)**

Bucovăț 6.IX.1984 (1 ex.); Dăbuleni 7.V.1987 (1 ex.); Alba 2.IX.1985 (1 ex.); Caraorman 13.V.1991 (2 ex.); Niculițel 10.VI.1985 (4 ex.); eurosiberian species

***Stictopleurus subtomentosus* Rey 1888 ***

Prunet 4.IX.1984 (1 ex.); Dăbuleni 7.V.1987 (1 ex.); Craiova (Obedeanu) 7.IX.1984 (5 ex.); holomediterranean species

Family Stenocephalidae

***Dicranocephalus agilis* (Scopoli 1763)**

Cluj-Napoca 28.V.1985 (1 ex.); 2.V.1986 (2 ex.); 28.IV.1988 (1 ex.); Tureni Gorges 11.IX.1987 (1 ex.); Hagieni Forest 29.VI.1986 (1 ex.); palearctic species

***Dicranocephalus albipes* (Fabricius 1781)**

Periprava 8.VII.1987 (3 ex.); Tulcea 15.VII.1987 (1 ex.); 8.VII.1990 (3 ex.); Caraorman 24.VI.1991 (1 ex.); 5.VII.1991 (1 ex.); euromediterranean species

Dicranocephalus medius* (Mulsant & Rey 1870)

Cluj-Napoca 6.VI.1978 (1 ex.); Semenice Mts. 18.IX.1989 (1 ex.); west eurosiberian species

REFERENCES

1. Dursun, A., & Fent, M., 2009, A study on the Coreidae (Insecta: Heteroptera) of the Kelkit Valley, Turkey, *Acta entomologica serbica*, **14** (1): 13–25.
2. Kis, B., 1972, Ord. Heteroptera In: L'entomofaune de "grind" de Caraorman (Delta du Danube), *Trav. Mus. d'Hist. Nat. "Grigore Antipa"*, București, **12**: 131–139.
3. Kis, B., 1975, Heteroptera In: *Fauna- Grupul de Cercetări Complexe "Porțile de Fier"*, Ed. Acad. R.S.R.: 81–90.
4. Kis, B., 1976, Ord. Heteroptera In: L'entomofaune de nord de la Dobrogea, la zone Măcin- Tulcea- Niculițel, *Trav. Mus. d'Hist. Nat. "Grigore Antipa"*, București, **17**: 131–143.
5. Kis, B., 1984, Heteroptere, partea generală și suprafamilia Pentatomoidea, *Fauna R.S. România* vol. **8**, fasc. **8**: 1–214.
6. Kis, B., 1997 a, Heteroptere colectate în Parcurile Naționale Retezat și Valea Cernei In: Entomofauna Parcurilor Naționale Retezat și Valea Cernei, *Soc. Lepidopt. Română*, Cluj-Napoca: 43–49.
7. Kis, B., 1997 b, Heteroptere. In: Rezultatele taberei entomologice din Cheile Tișitei, Munții Vrancei, 26.06–6.07.1997, *Bul. de Inf. Soc. Lepidopt. Română*, Cluj-Napoca, **8** (1–2): 42–48.
8. Kis, B., Stănescu, A., 1995, Heteroptera. In: Rezultatele colectărilor realizate în a doua tabără entomologică SLR, Munții Făgăraș 23–30 iulie 1994, *Bul. de Inf. Soc. Lepidopt. Română*, Cluj-Napoca, **5** (3–4): 217–223.
9. Linnavouri, E., 2007, Studies on the Piesmatidae, Berytidae, Pyrrhocoridae, Stenocephalidae, Coreidae, Rhopalidae, Alydidae, Cydnidae and Plataspidae (Heteroptera) of Gilan and adjacent provinces in northern Iran, *Acta. Entom. Musei Nationalis Pragae*, vol. **47**: 77–91.
10. Negru, Șt., 1967, Ord. Heteroptera In: Entomofaune des forêts du sud de la Dobroudja, *Trav. du Mus. d'Hist. Nat. "Grigore Antipa"*, București, **7**: 115–118.
11. Negru, Șt., 1968, Ord. Heteroptera In: L'entomofaune de l'île de Letea (Delta du Danube), *Trav. du Mus. d'Hist. Nat. "Grigore Antipa"*, București, **9**: 123–125.
12. Schneider, E., 1973, Catalogul heteropterelor din colecțiile Muzeului de Istorie Naturală din Sibiu. *St. și Com. Șt. Nat., Muzeul Brukenthal*, **18**: 139–182.
13. Schneider, E., 1976, Ord. Heteroptera In: Contribution à la connaissance de la faune du département Vrancea, *Trav. du Mus. d'Hist. Nat. Grigore Antipa*, București, **17**: 281–291.
14. Sienkiewicz, I., 1960, Hétéroptères nouveaux pour la faune de la Roumanie, *Trav. du Mus. d'Hist. Nat. "Grigore Antipa"*, București, **2**: 241–243.
15. Sienkiewicz, I., 1962, Hétéroptères nouveaux pour la faune de la Roumanie, *Trav. du Mus. d'Hist. Nat. "Grigore Antipa"*, București, **3**: 533–535.
16. Sienkiewicz, I., 1964, *The catalogue of the A. L. Montandon Collection of palearctic Heteroptera preserved in the "Grigore Antipa" Museum of Natural History Bucharest*, Muz. de Ist. Nat. "Grigore Antipa", București.
17. Sienkiewicz, I., Paraschivescu, D., 1963, Contribution to the study of the heteroptera from the Dobrogea region, *Trav. du Mus. d'Hist. Nat. "Grigore Antipa"*, București, **4**: 230–237.
18. Șerban, Cecilia, 2010, *Study of the Coreoidea fauna (Insect, Heteroptera, Coreoidea) in the lower basin of the Siret River and the Măcin Mountains region*, On-line: <http://web.ubbcluj.ro/ro/pr-acad/rezultate/2010>.
19. Togănel, F., 2006, Heteroptere din colecția "Bela Kis" conservate în Muzeul de Științele Naturii din Târgu-Mureș (Heteroptera: Miridae), *Oltenia Stud. și com. Șt. Nat., Muzeul Olteniei*, Craiova, vol. **22**: 128–134.
20. *** <http://www.faunaeur.org> (AUKEMA B. 2010).

**HETEROPTERE COREOIDE DIN COLECȚIA “KIS BELA” CONSERVATE ÎN MUZEUL DE ȘTIINȚELE NATURII TÂRGU-MUREȘ (INSECTA: HETEROPTERA: COREOIDEA)
(Rezumat)**

Lucrarea prezintă lista speciilor de heteroptere coreoide aparținând colecției “Bela Kis” conservată în Muzeul de Științele Naturii din Târgu-Mureș. Colecția de heteroptere a fost achiziționată de muzeu în anii 1997 și 1998.

Colecția numără 2286 exemplare aparținând la 521 specii, 244 genuri și 32 familii și are valoare de document faunistic.

Suprafamilia Coreoidea cuprinde 271 exemplare. Materialul provine din 53 de locuri de colectare din diverse zone ale țării. El a fost determinat de Bela Kis și este prezentat în ordine alfabetică.

Materialul biologic aparține la 25 genuri cu 40 specii cuprinse în 4 familii: **Alydidae**, **Coreidae**, **Rhopalidae** și **Stenocephalidae**.

Cele mai multe specii aparțin familiilor Rhopalidae (19 specii) și Coreidae (15 specii).

Colecția cuprinde toate speciile de Alydidae (3), 95% dintre speciile de Rhopalidae, 75% dintre speciile de Stenocephalidae și 51,72% dintre speciile de Coreidae cunoscute în fauna țării noastre.

Speciile: *Megalotomus junceus* (Scopoli 1763), *Arenocoris fallenii* (Schilling 1829), *Ceraleptus lividus* (Stein 1858), *Phyllomorpha laciniata* (Villers 1789), *Agraphopus lethierryi* Stål 1872, *Chorosoma gracile* Josifov 1968, *Leptoceraea viridis* Jakovlev 1873, *Maccevethus errans caucasicus* (Kolenati 1845), *Stictopleurus pictus* (Fieber 1861), *Stictopleurus subtomentosus* Rey 1888 și *Dicranocephalus medius* (Mulsant & Rey 1870) sunt rare în fauna României.

THE ORNITHOLOGICAL COLLECTION OF MUREȘ COUNTY MUSEUM NATURAL SCIENCE BRANCH

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Abstract: This paper presents an inventory of Târgu-Mureș Natural Science Museum ornithological collection. This collection include a number of 667 specimens prepared as skins and naturalizations. For each species is mentioned the inventory number, age, sex, date and collecting place and the type of preparation.

Keywords: ornithological collection, inventory, Mureș County Museum, Natural Science Branch.

The ornithological collection of Mureș County Museum, Natural Sciences Branch, is comprised from 667 specimens of birds prepared as skins (329) and naturalizations (338) (October 2010).

The necessity of creating a vertebrate collection came at the same time with the creation of the Mureș Regional Museum. This activity intensified once Kónya István (newly licensed biologist) joined the staff in 1952 as a museologist.

The first bird specimens were acquired from the taxidermist laboratory of The General Sport Association of Hunters and Fishermen – Bucharest. The specimens were naturalized for commercialization, and they had no collecting data. Their origin can only be approximated (România, Muntenia, Danube Delta etc.), and the collecting data is close to the one recorded on the records of proceedings.

The common species, without any collecting data can be used for temporary exhibits, yet most of them do not posses qualities that will add them to the basic stock collection. The fact that some were added to the basic stock collection list is motivated by their exceptional quality or by the fact that those were rare specimens. My conviction is that those specimens will last in time (if kept in optimal conditions), and will not be problematic for any future conservatory.

In 1957 The Mures Regional Museum, moved in the current location (24, Horea Street) where the Natural Sciences Branch received an office-laboratory of 12 m², with an attic, and two storage units for collections, set in the hallway. Those scarce conditions have determined the next set of specimens to be preserved as skins. After 1969, members of our group (ITK) “Young Friends of Nature” became part of the Museum outside contributors, bringing as donations dozens of unprepared specimens, at first collected by hunters, and prepared by me as skins afterwards.

In 1967, I was offered a job as a laborer at the museum, and I unconditionally accepted it, leaving the furniture factory, where I was working as a category V upholsterer. By 1989 I have took all the specialization courses offered by the Center of Training Working Personnel from the Minister of Culture, on all the domains of preparation: taxidermy, restoration, conservation, obtaining all the necessary diplomas. Since the Department of Ethnography and the ones of modern and contemporary history have moved in a different building, and the Archeology department as well as the history department had the same perspectives, we saw a possibility of creating a showroom for the Natural Sciences Museum. That would have implied getting new specimens and preserving them as naturalizations.

The process of collecting ornithological materials is not possible without corresponding fire arms. The department director was a member of the Regional Association of sports Hunting and Fishing (AJVPS Mureş). He never participating in sport hunting and only used the fire arm for collecting specimens that would become part of the museum collection. In time individual hunting was restricted, therefore impeding the collecting process. The small caliber fire arm was restricted by law, as well as purchasing ammunition. Mr. Kónya had to hand over his gun to the police station and he withdrew from the association. After 1986 (his retirement year), the Department director was taken over by Sárkány Kiss Andrei, museologist-biologist. He decided to become a hunter in order to be able to continue preparing material for exhibits. He had to do that on individual resources. (I was never able to contribute personally to the enrichment of the collection, since my request to become a member of AJVPS was dismissed twice).

Another method for procuring materials proved itself to be high efficient. With the help of my brothers (Aladár and Ştefan) whom were hunters, I got in contact with many other hunters. I managed to convince some of them to donate interesting specimens without any remuneration. I believe it is my moral obligation to acknowledge this in writing, aside my thanks, the only late recognition I am able to show for the contribution they brought to our collection.

In 1989 the principal departmental exhibit was opened, in which we presented among other things 114 naturalized birds. (By 2010 we used over 200 naturalized specimens in temporary collections presented by the department or in other museums.) After 1990 no other specimen was collected by museum staff (since there was nobody on staff with a hunting permit). We have only received donations of hunted specimens or accident specimens (cars, electricity, windows impact, tall buildings) found dead. In this manner we managed to increase the collection to 667 specimens, from which 338 naturalized, and 329 prepared as skins.

Specimens origin:

donations	300
acquisitions	95 (–45)
collecting	264 (+45)
unclear	8

- (the 45 specimens were collected by museum staff, yet the preparation was made by an external preparatory for remuneration, since the institution has not had a specialist at the time)

Those specimens were prepared by:

AGVPS Bucureşti	11	Kónya István	7
Filep Iuliu	85	Kónya István jr.	8
Kákonyi	1	X Y	20
Kohl Şt. – Kónya I	2	Szombath Zoltán	517
Kohl Ştefan	16		

List of donors of unprepared specimens			
Ács János	4	Kovács István	4
Antal István	1	Kulcsár László	2
Antal László	10	Luca Iolanda	1
Berekméri András	6	Mátyás Mihály	1
Bogdán Jenő	1	Miko István	2
Boros Gábor	4	Moldován István	1
Boros György	3	Mózes Ferenc	2
Brătianu – Sárkány	1	Nagy László	1
Ciolomic Dorin	1	Naphegyi György	1
Ciolomică Dorel	1	Nemes Sándor	1
Csomós Benedek	3	Negruți Fekete Octavian	1
Daróczi Szilárd	9	Oprea Romeo	1
Deák Ferenc	1	Pál Béla	1
Elekes Sándor	2	Pap A.	1
Erdélyi Béla	1	Pap Péter	3
Farcádi Domokos	1	Papp	1
Filep Iuliu	1	Papp Tamás	4
Filep Kálmán	1	Rang Cătălin	1
Fodor István	2	Rusu Ioan	1
Gombos Atilla	22	Rusu Ioan (ranger)	1
Grăd. Zoo	2	Săcălean Octavian	1
Gyarmati János	1	Sárkány Atilla	4
Gyékény Gertrud	2	Sárkány Péter	1
György László	1	Sárossi Dániel	1
Hârșan Mircea	2	Sinka Balogh Zoltán	4
Horváth Sándor	1	Szabó Iosif	16
Incze	1	Szabó László	1
Kalabér Ladislau	2	Székely Zoltán	1
Kelemen ?	2	Szombath Aladár	61
Kelemen Attila	3	Szombath Alexandru	1
Kelemen Kálmán	1	Szombath Árpád	1
Kerekes István	1	Szombath Péter	2
Keszeg Arnold	2	Szombath Ștefan	45
Kiss J. Botond	4	Vajda Zoltán	1
Kiss Sándor	1	Venczel Zsigmond	1
Kiss Zoltán (pharmacist)	2	Vicol Vasile	2
Kiss Zoltán (professor)	1	X Y	7
Kohl Ștefan	2	Zeitz Robert	4
Kónya Andor	1	Zilișteanu Radu	1
		Zoo – Țirgu Mureș	7
Total 300			

The provenience of ornithological pieces (by inventory number)

Ács János: (D) 412, 458, 489, 508
AJVPS, MS: (?) 442
AGVPS, București: (A) 430, 441, 442, 474, 475, 476, 514, 515, 525, 539, 665, 666
Antal István: (D) 543
Antal László: (D) 46, 54, 297, 299, 352, 368, 496, 599, 635, 650
Berekméri András: (D) 333, 466, 473, 604, 607, 608
Bogdán Jenő: (D) 341
Boros Gábor: (D) 229, 278, 437, 510
Boros György: (D) 423, 434, 652
Botoș Daniela: (C) 545
Brătianu – Sárkány: (C) 511
Cantor Ileana: (C) 414
Cioloboc Ioan: (C) 621, 622, 623, 624, 625, 626
Ciolomic Dorin: (D) 336
Ciolomică Dorel: (D) 482
Csomós Benedek: (D) 306, 307, 308
Dali Csaba: (C) 316
Daróczi Szilárd: (D) 322, 323, 522, 573, 574, 594, 595, 598, 630
Deák Ferenc: (D) 5, 7, 108
Elekes Sándor: (D) 100, 101
Erdélyi Béla: (D) 445
Erdélyi László: (A) 20
Farcádi Domokos: (D) 615
Filep Iuliu: (A) 13, 14, 17, 88, 104, 105, 106, 109, 110, 142, 220, 221, 222, 223, 224, 410, 432, 452
Filep Kálmán: (D) 535
Fodor István: (D) 6, 543
Gáll Pál: (D) 201, 202
Gombos Atilla: (D) 32, 35, 51, 52, 55, 64, 79, 182, 183, 185, 187, 188, 189, 193, 210, 296, 329, 361, 370, 406, 483, 566
Grăd. Zoo: (D) 422, 660
Gyarmati János: (D) 596
Gyékény Gertrud: (D) 585, 586
György László: (D) 512
Hârșan Mircea: (D) 331, 399
Horváth Sándor: (D) 429
Incze: (D) 449
Joja Grigore: (C) 384
Kalabér Ladislau: (D) 18, 279
Kelemen ? (D) 350, 355
Kelemen Attila: (D) 53, 212, 464
Kelemen Kálmán: (D) 303
Kerekes István: (D) 313
Keszeg Arnold: (D) 420, 527
Kiss J. Botond: (D) 60, 371, 457, 509

Kiss Sándor: (D) 597
Kiss Zoltán farm.: (D) 328, 548
Kiss Zoltán prof: (D) 544
Kohl Ștefan: (D) 480, 481
Kónya Andor: (D) 295
Kónya I. – Orbán A.: (C) 140
Kónya I., Szilágyi A.: (C) 4
Kónya I. – Szombath Z. (C) 507
Kónya István: (C) 1, 8, 10, 11, 12, 15, 21, 28, 31, 34, 37, 38, 39, 40, 41, 43, 44, 49, 50, 58, 67, 68, 69, 70, 71, 72, 73, 74, 76, 77, 81, 83, 84, 85, 86, 87, 89, 90, 91, 92, 93, 95, 96, 97, 98, 103, 107, 113, 114, 117, 119, 121, 122, 129, 131, 132, 135, 136, 138, 144, 147, 148, 149, 152, 156, 157, 158, 162, 164, 165, 166, 167, 169, 170, 172, 173, 175, 176, 177, 178, 184, 186, 195, 196, 197, 198, 199, 200, 206, 207, 215, 219, 225, 230, 231, 233, 234, 235, 236, 237, 240, 242, 243, 249, 251, 252, 253, 254, 255, 256, 257, 258, 260, 261, 263, 264, 270, 271, 272, 273, 274, 276, 277, 280, 281, 282, 283, 302, 334, 335, 342, 344, 346, 377, 387, 388, 390, 394, 395, 401, 415, 416, 418, 421, 424, 425, 431, 436, 443, 444, 446, 447, 450, 484, 485, 492, 495, 536, 555, 570, 612, 636, 641 (163 ex)
Kovács István: (D) 319, 320, 529, 530
Kulcsár László: (D) 226, 568
Lazăr Ioan: (C) 517
Luca Iolanda: (D) 521
Mátyás Mihály: (D) 565
Mezei István: (D) 232, 238, 241, 275
Miko István: (D) 409, 493
Moldován István: (D) 583
Mózes Ferenc: (D) 428, 487
Nagy László: (D) 520
Naphegyi György: (?) 448
Nemes Sándor: (D) 358
Negruți Fekete Octavian (D) 667
Oprea Romeo: (D) 426
Orbán Albert: (C) 19, 75, 99, 130, 137, 143, 159, 160, 161, 174, 181, 259, 343, 349, 386, 391, 392, 417, 433, 531
Pál Béla: (D) 589
Pap A.: (D) 168
Pap Péter: (D) 317, 318, 634
Papp: (D) 163
Papp Tamás: (D) 314, 523, 651, 663
Petică Mihai: (C) 590
Rang Cătălin: (D) 411
Robert Endre: (D) 116
Rusu Ioan: (D) 477
Rusu Ioan (păd.): (D) 661
Săcălean Octavian: (D) 526
Sárkány Atilla: (D) 301, 404, 584
Sárkány K. Andrei: (C) 265, 285, 286, 287, 289, 290, 291, 292, 294, 298, 300, 304, 310, 311, 326, 337, 347, 360, 362, 366, 367, 369, 378, 379, 380, 382, 385, 393, 405, 463, 468, 488,

501, 504, 537, 540, 551, 554, 557, 560, 561, 562, 563, 572, 575, 576, 577, 578, 579, 600, 601, 554, 557, 560, 610, 616, 619, 620, 628, 631, 637, 639, 642, 645, 646, 654, 655, 662, 664 (66 ex)

Sárkány Péter: (D) 293

Sárossi Dániel: (D) 150

Sinka Balogh Zoltán: (D) 591: 606: 656: 657

Szabó Iosif: (D) 3, 16, 33, 134, 203, 214, 217, 248, 383, 407, 459, 461, 518, 550, 580, 611,

Szabó László: (D) 460

Székely Zoltán: (D) 356

Szilágyi Alexandru: (C) 94, 118, 120, 245

Szombath Aladár: (D) 29, 36, 47, 48, 57, 59, 61, 62, 65, 82, 102, 115, 133, 141, 145, 146, 151, 153, 171, 190, 191, 192, 204, 211, 213, 216, 218, 244, 247, 309, 330, 332, 338, 340, 345, 354, 357, 359, 375, 389, 408, 439, 462, 471, 490, 494, 497, 500, 503, 505, 506, 538, 541, 546, 547, 549, 552, 556, 564, 569, 602, 617, 633, 653 (64 ex)

Szombath Alexandru: (D) 348

Szombath Árpád: (D) 440

Szombath Péter: (D) 239, 644

Szombath Ștefan: (D) 2, 9, 26, 56, 63, 78, 126, 127, 180, 209, 228, 269, 284, 288, 305, 312, 327, 381, 398, 413, 438, 453, 454, 455, 465, 467, 486, 491, 498, 499, 502, 516, 519, 528, 542, 553, 558, 567, 603, 609, 613, 614, 618, 638, 640 (45 ex)

Szombath Zoltán: (C) 80, 111, 124, 125, 128, 179, 205, 208, 227, 246, 250, 262, 266, 267, 268, 315, 339, 351, 353, 363, 364, 365, 372, 373, 374, 376, 396, 397, 400, 402, 403, 435, 451, 469, 478, 479, 559, 571, 592, 593, 632, 647, 648, 649 (44 ex)

Vajda Zoltán: (D) 513

Venczel Zsigmond: (D) 456

Vicol Vasile: (D) 324, 325

Weltzer Fernc: (D) 66, 112

X Y: 22, 23, 24, 25, 27, 30, 42, 45, 139, 194, 470, 524, 532, 533, 534, 658, 659

Zeitz Robert: (D) 321, 419, 587, 629

Zilișteanu Radu: (D) 605

Zoo – Tîrgu Mureș: (D) 154, 155, 427, 472, 581, 582, 588

Zrinyi Andrei: (C) 123

Abbreviations: A = acquisition, C = collecting, D = donation, XY= unknown, ? = unclear

Specimens collected by museum staff

Botoș Daniela	1	Kónya István	163
Cantor Ileana	1	Lazăr Ioan	1
Cioloș Ioan	6	Orbán Albert	20
Dali Csaba	1	Petică Mihai	1
Joja Grigore	1	Sárkány K. Andrei	66
Kónya I.- Orbán A.	1	Szombath Zoltán	44
Kónya I., Szilágyi A.	1	Zrinyi Andrei	1
Kónya I.-Szombath Z	1		

Total 309

We hope that the publication of this list will satisfy the ornithologist requests, which wanted to use our materials in multiple works prior. We hope this list will contribute as well to the ornithological inventory of the area offered by existing museum collections.

Since there is no recent reference list, or a local reference list put together by specialized personnel, I will use the last ornithological publication: “Nomenclatorul păsărilor din România”, published in 2006, by László Szabó-Szeley and Zoltán Baczó, verified with www.faunaeur.org, as well as the polyglot bird dictionary.

To prepare the specimens we have avoided strapping, using just zinc wire, galvanized wires, inox and copper.

Artificial bodies were fabricated from wood shavings (on bigger specimens), and rarely out or sea grass. For skins we used moss, tailoring cotton, and sanitary cotton. After expanded polystyrene was available we learned at a specialization course how to sculpt the bodies out of this light material. Continuing this procedure at home as well, I crafted dozens of small and medium specimens using this material.

Parasites eradication was done in a box with eremitic lid (100x170x140 cm) in which the skins were introduced (the skins and the drawers), as well as the gas (carbon sulfur, CS₂). The specimens were kept in the box for an interval of 2 days to a couple of weeks, trying to prevent hatching of possible future parasites. After emptying the box, I have noticed that some of the polystyrene bodies have diminished in size melting partially and forming a crust on the interior of the skins and wires, and in some small specimens they disappeared completely. I found the restoration of those specimens being a technical punishment, which came from the lack of detailed knowledge about the utilization of this new technique. I am proud of this failure since it was an outlet for professional growth, and I hope that any futures preparatory that are reading those lines will avoid such traps in the future. For the conservation of the specimens I have used arsenic until 2000, in addition to less toxic substances, learned from specialization courses.

The collection was disinfected annually in the gas box, and after the carbon sulfur ban, we hired specialists for the preventive deparasitation of the building. In the last 20 years I have applied this treatment 3-4 times in the building with a spraying pump, using over the counter substances such as Empaire and K-Othrin SC 25. The specimens are treated with different aerosols insecticides. In the skins drawers we have used preventively naphthalene, and newly thymol crystals. The hygiene, dusting, and periodical verification of material are an obligatory routine.

Momentarily, a new building is being worked on in the museum premises, where the ornithological department will be moved. For the past 10 years the section was arranged in an inadequate location in the adjacent attic of the office-laboratory. In the new building a healthy microclimate will be provided for the collection, since the organics specimens are more vulnerable to environmental impacts. This future possibility is bringing joy to the ones that contributed to the creation and growth of this collection, as well as to the staff.

The names of localities are indicated according to the inventory register of the Târgu-Mureș Museum Natural Sciences Branch.

List of collecting places

6 Martie, TL	2	Mila 23, TL	2
Acățari, MS	1	Mitrești, MS	1
Adrianu Mare, MS	1	Morești, MS	37
Aluniș, MS	1	MS	6

Arcalia, BN	1	Muntenia	6
Band, MS	1	Mureșeni (Țirgu Mureș) MS	3
Bărdești, MS	1	Murighiol TL	3
Berghia, MS	1	Nazna, MS	4
Bilbor, HR	7	Onuca, MS	1
Bistra Mureșului, MS	2	Păingenii, Glodeni, MS	3
Borzont (Bucin), HR	1	Petea, MS	1
Botorca, MS	1	Petelea, MS	1
Breaza, MS	1	Piatra Unică, HR	2
Căpîlnița, HR	1	Praid, HR	3
Cefa (Oradea), BH	1	Răstolița, MS	3
Cerghid, MS	3	Reghin, MS	5
Ceuașu de Cîmpie, MS	2	Rîciu, MS	6
Chibed, MS	1	România	12
Chinari, MS	13	Roteni, Acățari, MS	2
Chirileu, Sînpaul MS	3	Săbed, MS	11
Cipău, MS	7	Săcădat (Sovata), MS	2
Cîmpenița, MS	1	Sîncraiu de Mureș, MS	1
Cluj – Napoca, CJ	2	Sîngeorgiu de Mureș, MS	66
Cornești, MS	1	Sîngeorgiu de Pădure, MS	1
Crăiești, MS	1	Sînpaul, HR	3
Cristești, MS	34	Sînpaul, MS	1
Cuieșd, MS	1	Sîntioana de Mureș, MS	4
Curteni, Sântana de Mureș, MS	2	Socodor, AR	2
Deda, MS	1	Someșeni, CJ	1
Delta Dunării – Țirgu Mureș – Zoo	5	Stânceni, MS	1
Demieni, MS	1	Suplac, MS	1
Deșag, HR	1	Suveica, MS	1
Dumbrăvioara, MS	4	Șilea Nirajului, MS	1
Ercea, MS	2	Șimand, AR	2
Ernei, MS	7	Tăureni (Zau de Cîmpie), MS	1
Fărăgău, MS	9	Tirimia, MS	3
Filitelnic, MS	1	Tirimioara, Crăciunești, MS	2
Fîntînele, MS	1	Țirgu Mureș, MS	144
Găești, MS	2	Țirgu Mureș, Zoo, MS	2
Gălești, MS	1	Țîrnăveni, MS	1
Glodeni, MS	9	Tofalău, Sîngeorgiu de Mureș, MS	7
Gornești, MS	6	Toldal, MS	10
Gruisor, MS	1	Tonciu, Fărăgău, MS	1
Gurghiu, MS	2	Turda (Cheile Turzii), CJ	1
Hărănglab, MS	1	Turia (Bálványos), CV	2
Hășmașul Mare, HR	21	Ulcani, HR	1
Icland, MS	10	Ungheni, MS	5
Iernut, MS	66	Valea Izvoarelor, MS	1
Lacul Roșu, HR	3	Văleni, MS	3
Lechincioara (Șincai), MS	2	Vălenii (Acățari), MS	6
Lechința de Mureș, MS	2	Vârșag, HR	1

Livezeni, MS	3	Vidrasău, MS	5
Lodroman, AB	1	Viforoasa, MS	1
Lunca Bradului, MS	2	Voiniceni, MS	1
Maliuc, TL	3	Voivodeni, Mureș	1
Malnaș, CV	2	Zau de Cîmpie, MS	2
Matița, TL (Delta Dunării)	1		
Mărtiniș, HR	1		
Total pieces	667		
Number of localities	114		

Systematic inventory of birds collection

Inv. No.	Age	Sex	Collecting place	Date	Prep.
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Order Gaviiformes

Family Gaviidae

Gavia stellata (Pontoppidan, 1763)

450	juvenile	♂	Tîrgu Mureș, MS	1960.11.11	nat.
455	adult	♀	Iernut, MS	1983.11.09	nat.
456	adult	♀	Vidrasău, MS	1983.10.21	nat.
460	adult	♂	Ulcani, HR	2002.11.04	nat.

Gavia arctica (Linnaeus, 1758)

451	adult	♀	Tîrgu Mureș, MS	1970.11.01	nat.
452	adult	?	Tîrgu Mureș, MS	1958	nat.
453	adult	♀	Iernut, MS	1983.10.13	nat.
454	adult	♀	Iernut, MS	1983.10.13	nat.
457	adult	♀	6 Martie, TL	1984.11.30	nat.
458	juvenile	♀	Glodeni, MS	1985.10.29	nat.
459	adult	♂	Mărtiniș, HR	1991.05.30	skin
461	adult	♀	Sînpaul, HR	1980.11.02	nat.

Order Podicipediformes

Family Podicipedidae

Tachybaptus ruficollis (Pallas, 1764)

149	adult	?	Sîngeorgiu de Pădure, MS	1967.01.08	skin
568	adult	♀	Morești, MS	1980.03.14	skin
469	juvenile	♀	Tîrgu Mureș, MS	1968.07.18	nat.
470	adult	?	România	1955.11.02	nat.

Podiceps cristatus (Linnaeus, 1758)

151	adult	?	Tîrgu Mureş, MS	1966.12.17	skin
153	adult	♀	Tîrgu Mureş, MS	1967.05.18	nat.
462	juvenile	♂	Cristeşti, MS	1975.11.24	nat.
471	adult	?	Moreşti, Ungheni, MS	1964.	nat.

Podiceps grisegena (Boddaert, 1783)

150	adult	♂	Tîrgu Mureş, MS	1973.03.16	skin
333	adult	♀	Cristeşti-Mureş, MS	1985.04.14	nat.
463	adult	♀	Iernut, MS	1983.10.27	nat.
464	adult	♂	Tîrgu Mureş, MS	1975.04.15	nat.

Podiceps nigricollis C. L. Brehm, 1831

152	adult	?	Tîrgu Mureş, MS	1959.09.03	skin
465	adult	♀	Iernut, MS	1983.10.27	nat.
466	adult	♂	Cristeşti-Mureş, MS	1985.04.14	nat.
467	adult	♂	Sîngeorgiu de Mureş, MS	1971.04.04	nat.
468	juvenile	♀	Iernut, MS	1983.10.05	nat.

Order Pelecaniformes**Family Phalacrocoracidae*****Phalacrocorax carbo*** (Linnaeus, 1758)

474	adult	?	România	1955.03.31	nat.
475	immature	?	România	1955.10.26	nat.
476	immature	?	România	1955.03.18	nat.

Phalacrocorax pygmaeus (Pallas, 1773)

406	adult	♀	Moreşti, Ungheni, MS	1969.04.13	nat.
473	juvenile	♂	6 Martie, TL	1984.11.30	nat.

Family Pelecanidae***Pelecanus crispus*** Bruch, 1832

472	immature	?	Delta Dunării, TL – Tîrgu Mureş, Zoo	1988. vara	nat.
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Order Ciconiiformes

Family Ardeidae

Botaurus stellaris (Linnaeus, 1758)

329	adult	♂	Morești, Ungheni, MS	1970.02.01	nat.
477	adult	♂	Cipău, MS	1992.01.05	nat.

Ixobrychus minutus (Linnaeus, 1766)

478	juvenile	♀	Iernut, MS	1988.10.11	nat.
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Nycticorax nycticorax (Linnaeus, 1758)

340	juvenile	?	Iernut, MS	1978.08.20	skin
479	adult	♂	Morești, Ungheni, MS	1974.04.21	nat.

Ardea cinerea Linnaeus, 1758

328	immature	♂	Glodeni, MS	1980.09.12	nat.
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Ardea purpurea Linnaeus, 1766

665	adult	?	Muntenia, IF	1955.06.13	nat.
666	adult	?	Muntenia, IF	1955.04.29	nat.

Family Ciconiidae

Ciconia nigra (Linnaeus, 1758)

358	adult	?	Valea Izvoarelor, MS	1976.03.22	nat.
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Ciconia ciconia (Linnaeus, 1758)

383	adult	♂	Țîrgu Mureș, MS	1967.10.19	nat.
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Family Threskiornithidae

Plegadis falcinellus (Linnaeus, 1766)

154	juvenile	♀	Delta Dunării, TL – Țîrgu Mureș, Zoo	1971.11.05	skin
155	juvenile	♂	Delta Dunării, TL – Țîrgu Mureș, Zoo	1971.11.13	skin

Order Anseriformes**Family Anatidae*****Cygnus olor*** (Gmelin, 1789)

480	adult	?	Delta Dunării, TL – Tîrgu Mureș, Zoo	1983.01.	nat.
481	adult	♂	Delta Dunării, TL – Tîrgu Mureș, Zoo	1984.01.25	nat.

Cygnus cygnus (Linnaeus, 1758)

357	adult	♀	Ungheni, MS	1969.01.22	nat.
482	adult	♀	Cipău (Mureș River),_MS	1993.11.15	nat.

Anser fabalis (Latham, 1787)

659	adult	?	MS	1960-1970	nat.
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Anser albifrons (Scopoli, 1769)

483	juvenile	♂	Tîrgu Mureș, MS	1967.11.05	nat.
658	juvenile	?	MS	1960-1970	nat.

Tadorna tadorna (Linnaeus, 1758)

359	adult	♀	Cipău, MS	1969.05.27	nat.
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Anas penelope Linnaeus, 1758

490	adult	♂	Nazna, MS	1980.03.15	nat.
491	adult	♀	Iernut, MS	1983.11.15	nat.

Anas crecca Linnaeus, 1758

2	adult	♂	Morești, Ungheni, MS	1976.09.28	skin
305	?	♀	Iernut, MS	1983.11.15	skin
495	juvenile	♀	Maliuc, TL	1967.10.03	nat.
496	adult	♂	Mureșeni (Tîrgu Mureș), MS	1968.03.16	nat.
497	adult	♂	Iernut, MS	1975.10.19	nat.
498	adult	♀	Cristești-Mureș, MS	1976.10.24	nat.
499	adult	♂	Morești, Ungheni, MS	1976.10.24	nat.
502	adult	♂	Iernut, MS	1983.11.15	nat.

Anas platyrhynchos Linnaeus, 1758

1	adult	♀	Matîța, TL	1967.09.29	skin
302	adult	♂	Fărăgău, MS	1977.02.22	skin

304	adult	♂	Nazna, MS	1980.11.28	skin
330	adult	♂	Cristești, MS	1976.01.02	nat.
334	adult	♀	Vidrasău, MS	1968.01.24	nat.
339	adult	♂	Iernut, MS	1982.12.01	skin
484	adult	♂	Vidrasău, MS	1968.01.26	nat.
485	adult	♀	Cristești, MS	1976.02.17	nat.
486	adult	♂	Fărăgău, MS	1977.03.11	nat.
487	adult	♂	Morești, Ungheni, MS	1979.03.20	nat.
488	adult	♂	Iernut, MS	1982.12.03	nat.

Anas acuta Linnaeus, 1758

489	adult	♂	Voivodeni, MS	1983.03.15	nat.
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Anas querquedula Linnaeus, 1758

3	adult	♀	Cristești, MS	1968.03.24	skin
331	adult	♂	Morești, Ungheni, MS	1979.03.20	nat.
332	adult	♂	Iernut, MS	1971.03.13	nat.
500	adult	♂	Nazna, MS	1979.03.20	nat.
501	adult	♂	Nazna, MS	1980.03.18	nat.

Anas clypeata Linnaeus, 1758

492	adult	♀	Sîngeorgiu de Mureș, MS	1966.08.30	nat.
493	adult	♀	Tîrgu Mureș, MS	1982.10.07	nat.
494	adult	♀	Iernut, MS	1975.10.19	nat.

Aythya ferina (Linnaeus, 1758)

338	adult	♂	Lechința de Mureș, MS	1980.03.09	nat.
503	adult	♂	Iernut, MS	1971.03.11	nat.
504	adult	♀	Tîrgu Mureș (upstream), MS	1976.03.28	nat.
505	juvenile	♂	Cristești-Mureș, MS	1976.09.26	nat.
506	juvenile	♂	Cristești-Mureș, MS	1976.09.26	nat.

Aythya nyroca (Güldenstädt, 1770)

309	adult	♀?	Lechința (Iernut), MS	1980.03.09	nat.
310	adult	♀	Cipău, MS	1980.03.28	nat.
311	adult	♀	Cipău, MS	1980.03.28	nat.

Aythya fuligula (Linnaeus, 1758)

409	adult	♂	Tîrgu Mureș, MS	1975.04.18	nat.
509	adult	♂	Murighiol, TL	1968.02.10	nat.

Aythya marila (Linnaeus, 1761)

507	adult	♀	Tîrgu Mureş (upstream), MS	1973.10.24	nat.
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Somateria mollissima (Linnaeus, 1758)

407	adult	♀	Sînpaul, HR	1984.09.22	nat.
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Melanitta nigra (Linnaeus, 1758)

410	adult	?	Sîngeorgiu de Mureş, MS	1966.11.16	nat.
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Bucephala clangula (Linnaeus, 1758)

4	adult	♂	Tîrgu Mureş, MS	1971.11.30	skin
408	adult	♂	Iernut, MS	1971.03.04	nat.
508	adult	♂	Glodeni, MS	1981.11.10	nat.

Mergus serrator Linnaeus, 1758

412	adult	♀	Glodeni, MS	1985.10.29	nat.
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Order Falconiformes**Family Accipitridae***Haliaeetus albicilla* (Linnaeus, 1758)

421	immature	?	Mitreşti, MS	1966.02.	nat.
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Gyps fulvus (Hablizl, 1783)

139	adult	?	Tonciu, Fărăgău, MS	1906	nat.
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Circaetus gallicus (Gmelin, 1788)

422	adult	♀	Tîrgu Mureş, MS	1968.08.01	nat.
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Circus cyaneus (Linnaeus, 1766)

9	adult	♀	Iernut, MS	1971.10.24	skin
526	immature	♂	MS	2003.01.25	nat.

Circus macrourus (S. G. Gmelin, 1771)

441	adult	♂	România	1965 ?	nat.
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Accipiter gentilis (Linnaeus, 1758)

22	adult	♂	România	1965	skin
24	immature	♀	România	1965	skin
423	adult	♀	Țirgu Mureș, MS	1968.01.14	nat.
516	immature	♀	Rîciu, MS	1997.02.09	nat.
517	adult	♂	Chinari, MS	1999.12.12	nat.
518	pullus	?	Vârșag, HR	1991.06.19	nat.
519	adult	♀	Rîciu, MS	2004.02.07	nat.
520	adult	♂	Demieni, MS	2005.01.25	nat.
521	immature	♂	Țirgu Mureș, MS	2007.01.18	nat.
525	adult	♂	Muntenia, RO	1955.12.07	nat.

Accipiter nisus (Linnaeus, 1758)

7	adult	♀	Rîciu, MS	1958.01.01	skin
8	adult	♂ ?	Țirgu Mureș, MS	1958.02.	skin
376	adult	♀	Sîncraiu de Mureș, MS	1969.04.18	nat.
429	adult	♀	Țirgu Mureș, MS	1978.02.20	nat.
510	adult	♀	Țirgu Mureș (Stejăriș forest), MS	1968.03.05	nat.
511	immature	♀	Aluniș, MS	1975.11.29	nat.
512	adult	♀	Cuieșd, MS	1970.02.01	nat.
513	adult	♂	Adrianu Mare, MS	2006.12.21	nat.

Buteo buteo (Linnaeus, 1758)

419	adult	♀	Țirgu Mureș, MS	2002.01.17	nat.
425	adult	♀	Glodeni, MS	1977.02.02	nat.
514	adult	?	Muntenia, RO	1955.02.20	nat.
515	adult	?	Muntenia, RO	1955.01.12	nat.
522	adult	♂	Iernut, MS	2005.03.07	nat.
523	adult	♀	Țirgu Mureș, MS	2000.01.21	nat.
524	adult	♂	Țirgu Mureș, MS	2004.01.16	nat.

Buteo lagopus (Pontoppidan, 1763)

5	adult	?	Rîciu, MS	1958.01.01	skin
6	adult	?	Ceuașu de Cîmpie, MS	1957.12.29	skin
23	adult	?	România	1965	skin
389	adult	♂	Cîmpenița, MS	1980.02.17	nat.
667	adult	♂	Fîntînele, MS	1996.02.24	nat.

Aquila pomarina C. L. Brehm, 1831

163	adult	?	Livezeni, MS	1960.09.11	skin
426	juvenile	♂	Țirgu Mureș, MS	1968.05.27	nat.
427	adult	♀	Țirgu Mureș, MS	1967.11.13	nat.

Family Falconidae*Falco tinnunculus* Linnaeus, 1758

428	adult	♂	Morești, Ungheni, MS	1979.03.20	nat.
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Falco subbuteo Linnaeus, 1758

424	juvenile	♂	Vălenii, MS	1967.09.11	nat.
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Falco biarmicus Temminck, 1825

420	adult	♀	Tîrgu Mureș, Zoo, MS	2003.03.21	nat.
527	immature	♂	Lodroman, AB	1998.09.10	nat.

Falco cherrug Gray, 1834

430	immature	♂	România	1965 ?	nat.
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Order Struthioniformes**Family Dromaiidae***Dromaius novahollandiae*

660	adult	♀	Tîrgu Mureș, Zoo, MS	1990.09.23	nat.
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Order Galliformes**Family Tetraonidae***Bonasa bonasia* (Linnaeus, 1758)

529	adult	♂ ?	Turia (Bálványos), CV	1999 toamna	nat.
530	immature	?	Turia (Bálványos), CV	2001 vara	nat.
533	adult	?	Răstolița (Mt. Călimani), MS	1987.05.10	nat.

Tetrao urogallus Linnaeus, 1758

442	adult	♀	Praid (Bucin Pass), HR	1962.04.27	nat.
443	adult	♂	Bilbor, HR	1960.04.21	nat.
444	adult	♂	Bilbor, HR	1960.04.22	nat.
445	adult	♂	Bilbor, HR	1960.04.22	nat.
446	adult	♂	Lunca Bradului, MS	1970.05.01	nat.
447	adult	♂	Lunca Bradului, MS	1970.05.01	nat.
448	adult	♂	MS	1978.04.xx	nat.

449	adult	♂	MS	1972.	nat.
532	adult	♀	Răstolița (Mt. Călimani), MS	1987.04.25	nat.

Family Phasianidae

Perdix perdix (Linnaeus, 1758)

342	adult	♀?	Văleni, MS	1967.12.04	nat.
343	adult	♀	Țirgu Mureș, MS	1968.02.29	nat.
528	juvenile	?	Săbed, MS	1977.07.03	nat.
535	adult	?	Țirgu Mureș, MS	1970.	nat.

Phasianus colchicus Linnaeus, 1758

345	adult	♀	Săbed, MS	1978.03.12	nat.
399	adult	♂	Rîciu, MS	1984.01.08	nat.
531	adult	♀	Văleni, MS	1969.12.07	nat.
534	adult	♀	Rîciu, MS	1988.10.20	nat.

Order Gruiformes

Family Rallidae

Rallus aquaticus Linnaeus, 1758

25	adult	♂	România	1965 ?	skin
26	adult	♂	Iernut, MS	1983.11.15	nat.
326	adult	♂	Iernut, MS	1983.11.15	nat.
542	adult	♂	Iernut, MS	1974.09.15	nat.
543	adult	♂	Someșeni (Cluj), CJ	1976.02.09	nat.
544	adult	♀	Țirgu Mureș, MS	1989.01.16	nat.
545	adult	♂	Țirgu Mureș, MS	1997.10.15	nat.
663	adult	♀	Țirgu Mureș, MS	2009.10.21	nat.

Porzana porzana (Linnaeus, 1766)

147	adult	?	Zau de Cîmpie, MS	1959.09.08	skin
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Porzana parva (Scopoli, 1769)

548	adult	♂	Iernut, MS	1980.04.11	nat.
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Crex crex (Linnaeus, 1758)

27	adult	?	România	1965	skin
546	adult	♂	Lechincioara (Șincai), MS	1979.05.01	nat.
547	adult	♂	Lechincioara (Șincai), MS	1979.05.01	nat.

Gallinula chloropus (Linnaeus, 1758)

144	adult	?	Tîrgu Mureş, MS	1966.08.30	skin
145	adult	♂	Iernut, MS	1974.10.13	skin
146	adult	♂	Tîrgu Mureş, MS	1967.08.24	skin
541	juvenile	♀	Cristeşti-Mureş, MS	1974.10.05	nat.

Fulica atra Linnaeus, 1758

148	adult	?	Zau de Cîmpie, MS	1959.09.08	skin
327	adult	♂	Moreşti, Ungheni, MS	1976.10.24	nat.
538	adult	♂	Tîrgu Mureş, MS	1970.01.08	nat.
539	adult	?	Muntenia, RO	1955.03.31	nat.
540	adult	?	Tîrgu Mureş, MS	1979.12.04	nat.

Order Charadriiformes**Family Charadriidae*****Charadrius dubius*** Scopoli, 1786

30	adult	?	România	1966 ?	skin
415	adult	♀	Cipău, MS	1969.04.08	nat.

Pluvialis apricaria (Linnaeus, 1758)

550	juvenile	♂	Mureşeni (Tîrgu Mureş), MS	1967.10.17	nat.
551	juvenile	♂	Iernut, MS	1983.11.15	nat.

Pluvialis squatarola (Linnaeus, 1758)

296	juvenile	♂	Tîrgu Mureş (upstream on Mureş River), MS	1966.09.25	skin
382	adult	♂	Iernut, MS	1983.10.13	nat.

Vanellus vanellus (Linnaeus, 1758)

335	juvenile	♀	Iernut, MS	1983.10.06	nat.
416	adult	♂	Iernut, MS	1983.10.06	nat.
536	adult	♂	Iernut, MS	1983.10.06	nat.
537	adult	♂	Fărăgău, MS	1980.03.20	nat.
549	adult	♂	Ernei, MS	1968.03.17	nat.

Family Scolopacidae***Calidris canutus*** (Linnaeus, 1758)

32	adult	♂	Tîrgu Mureş, MS	1966.10.02	skin
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Calidris minuta (Leisler, 1812)

45	adult	?	Sângeorgiu de Mureș, MS	1965.08.18	skin
558	adult	♀	Cristești, MS	1967.10.17	nat.
559	adult	♂	Iernut, MS	1983.10.06	nat.

Calidris ferruginea (Pontoppidan, 1763)

39	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
40	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
41	adult	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
42	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
43	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
44	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin

Calidris alpina (Linnaeus, 1758)

29	adult	?	Târgu Mureș, MS	1966.07.26	skin
46	adult	♀	Tîrgu Mureș, MS	1969.09.28	skin
47	adult	♀	Tîrgu Mureș, MS	1966.07.26	skin
297	adult	♂ ?	Târg- Mureș, MS	1966.09.19	skin
560	adult	♀	Iernut, MS	1983.10.13	nat.
561	adult	?	Iernut, MS	1983.10.13	nat.
562	adult	♂	Iernut, MS	1983.10.06	nat.
563	adult	♀	Iernut, MS	1983.10.13	nat.
653	adult	♀	Tîrgu Mureș, MS	1966.07.26	nat.

Philomachus pugnax (Linnaeus, 1758)

34	adult	♀	Sîngeorgiu de Mureș, MS	1965.08.18	skin
35	adult	♀	Iernut, MS	1970.05.02	skin
36	adult	♂	Mureșeni, MS	1966.07.03	skin
37	adult	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
38	adult	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
554	adult	♂	Iernut, MS	1980.03.29	nat.
556	juvenile	♀	Tîrgu Mureș, MS	1967.11.11	nat.
571	adult	♂	Iernut, MS	1989.04.12	skin
290	adult	♂	Iernut, MS	1983.10.05	skin

Lymnocyrtus minimus (Brünnich, 1764)

557	adult	♂	Iernut, MS	1984.02.07	nat.
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Gallinago gallinago (Linnaeus, 1758)

53	adult	♂	Iernut, MS	1971.10.25	skin
55	adult	♂	Tîrgu Mureș, MS	1967.09.09	skin

56	adult	♂	Iernut, MS	1974.09.15	skin
57	adult	♀	Iernut, MS	1974.10.13	skin
284	adult	♂	Iernut, MS	1983.11.15	skin

Scolopax rusticola Linnaeus, 1758

306	adult	♂	Sîntioana de Mureș, MS	1980.05	skin
307	adult	♂	Sîntioana de Mureș, MS	1980.05	skin
308	adult	♂	Sîntioana de Mureș, MS	1980.05	skin
341	adult	♀	Săbed, MS	1979.04.29	nat.
552	adult	?	Săbed, MS	1977.10.30	nat.

Limosa limosa (Linnaeus, 1758)

553	adult	♀	Iernut, MS	1970.05.02	nat.
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Tringa stagnatilis (Bechstein, 1803)

33	adult	♀	Morești, Ungheni, MS	1968.04.28	skin
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Tringa nebularia (Gunnerus, 1767)

51	adult	♂	Morești, Ungheni, MS	1968.04.28	skin
52	adult	♂	Morești, Ungheni, MS	1968.04.28	skin
555	juvenile	♂	Mila 23, TL	1967.09.28	nat.

Tringa ochropus Linnaeus, 1758

48	adult	♂	Tîrgu Mureș, MS	1966.07.26	skin
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Tringa glareola Linnaeus, 1758

49	adult	♀	Tîrgu Mureș, MS	1974.04.26	skin
54	adult	♂	Morești, Ungheni, MS	1966.09.11	skin

Actitis hypoleucos (Linnaeus, 1758)

50	adult	?	Curteni, Sîntana de Mureș, MS	1965.08.23	skin
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Arenaria interpres (Linnaeus, 1758)

31	adult	♂	Tîrgu Mureș, MS	1966.08.28	skin
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Phalaropus lobatus (Linnaeus, 1758)

28	adult	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
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Family Stercorariidae

***Stercorarius pomarinus* (Temminck, 1815)**

413	juvenile	?	Iernut, MS	1982.10.05	nat.
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***Stercorarius parasiticus* (Linnaeus, 1758)**

411	adult	♂	Arcalia, BN	1980.10.01	nat.
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Family Laridae

***Larus minutus* Pallas, 1776**

61	juvenile	♂	Țirgu Mureș, MS	1967.09.17	skin
62	juvenile	♂	Țirgu Mureș, MS	1967.09.17	skin
572	adult	♀	Iernut, MS	1983.10.05	nat.

***Larus ridibundus* Linnaeus, 1758**

58	adult	♀	Maliuc, TL	1967.10.01	skin
59	juvenile	♀	Iernut, MS	1971.10.24	skin
60	adult	?	Murighiol, TL	1968.02.10	skin
288	adult	♀	Iernut, MS	1983.10.13	skin
289	juvenile	♀	Iernut, MS	1983.10.13	skin
569	adult	♂	Țirgu Mureș, MS	1978.03.02	skin
573	juvenile	♀?	Socodor, AR	2003.10.14	nat.
574	adult	♀?	Socodor, AR	2003.10.14	nat.
575	juvenile	♂	Iernut, MS	1979.12.07	nat.
576	juvenile	♀	Glodeni, MS	1985.09.13	nat.
578	adult	♀	Iernut, MS	1982.10.22	nat.
579	juvenile	?	Iernut, MS	1983.10.05	nat.

***Larus canus* Linnaeus, 1758**

63	adult	♂	Ungheni, MS	1974.04.21	skin
64	adult	♀	Țirgu Mureș, MS	1966.12.25	skin
564	adult	♀	Morești, Ungheni, MS	1968.01.25	nat.
565	immature	?	Grușor, MS	1971.11.21	nat.

***Larus michahellis*, J.F.Naumann, 1840**

65	juvenile	♂	Țirgu Mureș, MS	1966.11.24	skin
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Family Sternidae

***Sterna caspia* Pallas, 1770**

566	adult	♀	Cipău, MS	1969.04.23	nat.
567	juvenile	♂	Maliuc, TL	1977.09.02	skin

Sterna hirundo Linnaeus, 1758

580	adult	♂	Morești, Ungheni, MS	1969.09.28	nat.
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Chlidonias leucopterus (Temminck, 1815)

577	adult	♂	Iernut, MS	1984.05.10	nat.
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Order Columbiformes**Family Columbidae*****Streptopelia decaocto*** (Frivaldszky, 1838)

66	adult	?	Ungheni, MS	1965.02.21	skin
67	adult	♂	Sîngeorgiu de Mureș, MS	1965.02.21	skin
68	adult	?	Sângeorgiu de Mureș, MS	1965.02.21	skin
414	adult	♀	Tîrgu Mureș, MS	1983.05.21	nat.

Order Strigiformes**Family Tytonidae*****Tyto alba*** (Scopoli, 1769)

440	adult	♀?	Tîrgu Mureș, MS	1968.03.06	nat.
597	adult	♂	Breaza, MS	2003.01.20	nat.
598	adult	♂	Șimand, AR	2003.05.17	nat.

Family Strigidae***Otus scops*** (Linnaeus, 1758)

432	adult	♀	Dumbrăvioara, MS	1968.07.18	nat.
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Bubo bubo (Linnaeus, 1758)

431	adult	♀?	Săbed, MS	1959.12.13	nat.
581	adult	♀	Tîrgu Mureș, MS	1968.10.09	nat.

Athene noctua (Scopoli, 1769)

69	adult	?	Sîngeorgiu de Mureș, MS	1965.02.21	skin
70	adult	?	Sîngeorgiu de Mureș, MS	1965.08.12	skin
314	adult	♂	Livezeni, MS	1999.12.02	skin
388	adult	♂	Chinari, MS	1973.10.19	nat.
433	adult	♀	Ernei, MS	1969.12.09	nat.
434	adult	♀	Tîrgu Mureș, MS	1969.01.13	nat.
590	adult	♂	Tîrgu Mureș, MS	1975.11.19	nat.
591	adult	♂	Ceuașu de Cîmpie, MS	2002.06.22	nat.

***Strix aluco* Linnaeus, 1758**

439	adult	♀	Săbed, MS	1975.02.18	nat.
592	adult	♀	Țirgu Mureș, MS	2001.04.23	nat.
593	juvenile	♂	Țirgu Mureș, MS	2001.05.08	nat.
594	adult	♂	Țirgu Mureș, MS	2003.03.11	nat.
595	adult	♂ ?	Sîngeorgiu de Mureș, MS	2001.01.21	nat.

***Strix uralensis* Pallas, 1771**

303	adult	♀	Chibed, MS	1996.01.13	nat.
437	adult	♀	Țirgu Mureș (Stejăriș forest), MS	1968.03.26	nat.
438	adult	♀	Țirgu Mureș (Platoul Cornești), MS	1975.03.13	nat.
596	adult	♀	Șilea Nirajului, MS	1976.02.16	nat.

***Asio otus* (Linnaeus, 1758)**

71	pullus	♂	Tofalău, Sîngeorgiu de Mureș, MS	1974.04.11	Skin
72	pullus	♂	Tofalău, Sîngeorgiu de Mureș, MS	1974.04.11	Skin
435	adult	♀	Petelea, MS	1968.12.09	nat.
436	adult	♀	Cristești-Mureș, MS	1976.02.17	nat.
582	adult	♂ ?	Țirgu Mureș, MS	1967.11.28	nat.
583	adult	♀	Țirgu Mureș, MS	2000.02.02	nat.
584	adult	♂	Botorca, MS	1991.02.16	nat.
585	adult	♂	Șimand, AR	2003.03.28	nat.
586	adult	♂	Iernut, MS	2005.01.04	nat.
587	adult	♂	Țirgu Mureș, MS	2007.02.22	nat.
588	adult	♀	Țirgu Mureș, MS	1967.06.27	nat.
589	adult	♂	Sînpaul, MS	1991.01.23	nat.

Order Apodiformes

Family Apodidae

***Apus apus* (Linnaeus, 1758)**

629	juvenile	♂	Țirgu Mureș, MS	1995.09.02	nat.
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***Tachymarptis melba* (Linnaeus, 1758)**

630	adult	?	Turda (Cheile Turzii), CJ	2007.07.28	nat.
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Order Coraciiformes**Family Alcedinidae***Alcedo atthis* (Linnaeus, 1758)

337	adult	♀?	Iernut, MS	1983.11.15	nat.
354	adult	♂	Cristești-Mureș, MS	1976.01.07	nat.

Family Meropidae*Merops apiaster* Linnaeus, 1758

77	adult	?	Morești, Ungheni, MS	1967.05.28	skin
78	adult	♀	Morești, Ungheni, MS	1970.08.08	skin
344	adult	♂	Văleni, MS	1967.08.22	skin

Family Coraciidae*Coracias garrulus* Linnaeus, 1758

75	adult	♂	Vălenii (Acățari), MS	1967.09.10	skin
76	juvenile	♀?	Vălenii (Acățari), MS	1967.09.10	skin

Family Upupidae*Upupa epops* Linnaeus, 1758

73	adult	?	Sîngeorgiu de Mureș, MS	1965.08.13	skin
74	adult	?	Sîngeorgiu de Mureș, MS	1965.08.13	skin
336	adult	?	Petea, MS	1994.08.21	nat.

Order Piciformes**Family Picidae***Jynx torquilla* Linnaeus, 1758

362	adult	♂	Toldal, MS	1984.05.04	nat.
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Picus canus Gmelin, 1788

164	adult	♂	Tîrgu Mureș, MS	1958.03.18	skin
165	adult	♂	Vălenii (Acățari), MS	1968.04.06	skin
166	adult	♂	Reghin, MS	1960.04.10	skin
167	adult	♂	Glodeni, MS	1972.03.19	skin
168	adult	♂	Gălești, MS	1972.01.30	skin
169	adult	♂	Gornești, MS	1966.03.20	skin
170	adult	♀	Sîngeorgiu de Mureș, MS	1971.03.04	skin
380	adult	♀	Tofalău, MS	1977.02.11	nat.

Picus viridis Linnaeus, 1758

171	adult	♂	Cristești, MS	1974.10.05	skin
172	adult	♀	Chinari, Sîntana de Mureș, MS	1972.03.19	skin
173	adult	♂	Tîrgu Mureș, MS	1973.10.24	skin
347	adult	♀	Săcădat (Sovata), MS	1983.01.21	nat.
378	adult	♂	Toldal, MS	1982.01.15	nat.
379	adult	♀	Glodeni, MS	1981.11.25	nat.

Dryocopus martius (Linnaeus, 1758)

160	adult	♀	Hășmașu Mare, HR	1967.09.01	skin
161	adult	♂	Hășmașu Mare, HR	1968.07.02	skin
162	adult	♂	Hășmașu Mare, HR	1967.08.28	skin
348	adult	♂	Căpîlnița, HR	1976.04.01	nat.
599	adult	♀	Hășmașu Mare, HR	1969.09.26	nat.
600	adult	♀	Morești, Ungheni, MS	1991.02.15	nat.

Dendrocopos major (Linnaeus, 1758)

156	adult	♂	Hășmașu Mare, HR	1967.08.28	skin
157	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
158	adult	♂	Mila 23, TL	1967.09.25	skin
159	adult	♀	Vălenii (Acățari), MS	1967.10.24	skin

Dendrocopos syriacus (Hemprich et Ehrenberg, 1833)

141	adult	♂	Bărdești, MS	1968.02.27	skin
397	adult	♂	Fărăgău, MS	1977.02.22	nat.

Dendrocopos medius (Linnaeus, 1758)

140	adult	♂	Tîrgu Mureș, MS	1969.11.20	nat.
142	adult	♂	Tofalău, Sîngeorgiu de Mureș, MS	1968.09.22	skin
285	adult	♂	Morești, Ungheni, MS	1981.02.03	skin
601	adult	♂	Morești, Ungheni, MS	1991.02.15	nat.

Dendrocopos leucotos (Bechstein, 1803)

386	adult	♀	Praid, HR	1969.11.28	nat.
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Dendrocopos minor (Linnaeus, 1758)

143	juvenile	?	Filitelnic, MS	1967.09.18	skin
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Order Passeriformes

Family Alaudidae

Calandrella brachydactyla (Leisler, 1814)

79	adult	♂	Chirileu, Sînpaul, MS	1969.04.13	skin
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Galerida cristata (Linnaeus, 1758)

86	adult	♂ ?	Sîngeorgiu de Mureș, MS	1972.11.18	skin
87	adult	♂	Sîngeorgiu de Mureș, MS	1972.11.18	skin
88	adult	?	Tîrgu Mureș, MS	1965.03.14	skin
89	adult	?	Sîngeorgiu de Mureș, MS	1965.08.12	skin
90	adult	?	Curteni, Sîntana de Mureș, MS	1965.08.23	skin
373	adult	♂	Sîngeorgiu de Mureș, MS	1976.02.14	nat.

Alauda arvensis Linnaeus, 1758

80	adult	♂	Chirileu, Sînpaul, MS	1976.10.24	skin
81	adult	♂	Tîrgu Mureș, MS	1966.03.19	skin
82	adult	♀	Morești, Ungheni, MS	1966.04.10	skin

Family Hirundinidae

Hirundo rustica Linnaeus, 1758

384	juvenile	?	Stînceni, MS	1977.09.18	skin
385	adult	♂	Iernut, MS	1980.04.03	nat.

Family Motacillidae

Anthus pratensis (Linnaeus, 1758)

398	adult	?	Cristești-Mureș, MS	1976.03.21	nat.
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Anthus spinoletta (Linnaeus, 1758)

186	adult	♂	Dumbrăvioara, Ernei, MS	1968.03.17	skin
640	juvenile	♂	Iernut, MS	1982.10.21	nat.

Motacilla flava Linnaeus, 1758

187	adult	♂	Tîrgu Mureș (Mureșeni), MS	1968.04.20	skin
188	adult	♂	Tîrgu Mureș (Mureșeni), MS	1968.05.06	skin
189	adult	♂	Tîrgu Mureș (Mureșeni), MS	1968.04.20	skin
190	adult	?	Morești, Ungheni, MS	1967.05.28	skin
191	adult	♂	Tîrgu Mureș, MS	1966.04.15	skin
192	adult	?	Tîrgu Mureș (Mureșeni), MS	1966.05.29	skin
193	adult	♂	Morești, Ungheni, MS	1966.03.27	skin

194	adult	♂	MS	1966.07.01	skin
203	adult	?	Țirgu Mureș, MS	1966.07.01	skin

Motacilla alba Linnaeus, 1758

293	adult	♂	Toldal, Voivodeni, MS	1985.09.13	skin
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Family Bombycillidae

Bombycilla garrulus (Linnaeus, 1758)

201	adult	♂	Tirimioara, Crăciunești, MS	1958.03.19	skin
202	adult	♀	Tirimioara, Crăciunești, MS	1958.03.19	skin
301	adult	♂	Tărnăveni, MS	1991.02.03	skin
317	adult	♀	Cluj-Napoca, CJ	2001.03.22	skin
318	adult	♂	Cluj-Napoca, CJ	2001.03.22	skin
390	adult	♀	Țirgu Mureș, MS	1968.01.24	nat.
394	adult	♀	Țirgu Mureș, MS	1968.01.20	nat.
395	adult	♀	Țirgu Mureș, MS	1968.01.24	nat.

Family Cinclidae

Cinclus cinclus (Linnaeus, 1758)

124	adult	?	Țirgu Mureș, MS	1973.12.23	skin
125	adult	♂	Răstolița, MS	1973.11.28	skin
126	adult	♂	Dumbrăvioara, Ernei, MS	1972.01.23	skin
127	adult	♂ ?	Dumbrăvioara, Ernei, MS	1972.01.23	skin
128	adult	♂	Țirgu Mureș, MS	1973.12.23	skin
129	adult	?	Lacul Roșu, HR	1966.09.02	skin
130	juvenile	♂	Hășmașul Mare, HR	1967.08.27	skin
131	adult	?	Lacul Roșu, HR	1966.09.02	skin
351	adult	♂	Bistra Mureșului, MS	1974.09.27	nat.
352	adult	♂	Praid, HR	1969.09.28	nat.
353	adult	♀	Bistra Mureșului, MS	1974.09.12	nat.

Family Prunellidae

Prunella modularis (Linnaeus, 1758)

179	adult	♀	Lacul Roșu, HR	1969.09.28	skin
370	adult	♂ ?	Țirgu Mureș, MS	1967.10.17	nat.

Family Turdidae

Luscinia luscinia (Linnaeus, 1758)

657	adult	♂	Țirgu Mureș, MS	2005.07.05	skin
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Phoenicurus ochruros (S. G. Gmelin, 1774)

319	adult	♂	Malnaș, CV	2001.04.01	skin
320	adult	♂	Malnaș, CV	2001.04.01	skin

Saxicola rubetra (Linnaeus, 1758)

116	juvenile.	♀	Tîrgu Mureș, MS	1964.09.14	skin
117	juvenile.	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
132	juvenile.	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin

Saxicola torquata (Linnaeus, 1766)

115	adult	♂	Morești, Ungheni, MS	1966.05.15	skin
295	adult	♂	Tîrgu Mureș, MS	1982.03.19	skin

Oenanthe oenanthe (Linnaeus, 1758)

313	adult	♂	Deșag, HR	1999.04.14	skin
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Turdus torquatus Linnaeus, 1758

136	adult	♂	Bilbor, HR	1960.04.21	skin
137	adult	♀	Hășmașu Mare, HR	1968.07.01	skin
138	adult	♀	Bilbor, HR	1960.04.21	skin
174	juvenile.	♂	Hășmașu Mare, HR	1968.07.01	skin
175	adult	♀	Bilbor, HR	1960.04.21	skin
368	adult	♀	Hășmașu Mare, HR	1969.09.27	nat.

Turdus merula Linnaeus, 1758

176	adult	♀	Sîngeorgiu de Mureș, MS	1965.02.21	skin
177	adult	♂	Sîngeorgiu de Mureș, MS	1960.02.21	skin
178	adult	♂	Sîngeorgiu de Mureș, MS	1965.02.07	skin
417	adult	♂	Suplac, MS	1968.12.07	nat.

Turdus pilaris Linnaeus, 1758

13	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
14	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
15	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
16	adult	♂	Cristești, MS	1968.03.24	skin
17	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
133	adult	♀	Sîngeorgiu de Mureș, MS	1971.03.04	skin
312	adult	♀	Crăiești, MS	1998.11.28	skin
366	adult	♀	Ercea, MS	1981.12.22	nat.
381	adult	♀	Sîntioana de Mureș, MS	1978.02.11	nat.
631	adult	♀	Morești, Ungheni, MS	1991.02.15	nat.

Turdus philomelos C. L. Brehm, 1831

135	adult	♂	Hășmașu Mare, HR	1967.08.31	skin
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Turdus iliacus Linnaeus, 1766

134	adult	♂	Chinari, Sântana de Mureș, MS	1970.04.19	skin
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Turdus viscivorus Linnaeus, 1758

10	adult	♂	Hășmașu Mare, HR	1967.08.31	skin
11	adult	♂	Hășmașu Mare, HR	1967.IX.03	skin
12	adult	♂	Hășmașu Mare, HR	1967.IX.02	skin
18	adult	♀	Reghin, MS	1972.11.13	skin
19	juvenile	♂	Hășmașu Mare, HR	1968.07.01	skin
20	adult	?	Tîrgu Mureș, MS	1958.03.18	skin
21	adult	♂	Bilbor, HR	1965.04.21	skin
367	adult	♂	Săcădat (Sovata), MS	1983.01.21	nat.

Family Sylviidae

Locustella luscinioides (Savi, 1824)

181	adult	♀	Fărăgău, MS	1969.04.17	skin
182	adult	♂	Iernut, MS	1970.05.02	skin

Acrocephalus schoenobaenus (Linnaeus, 1758)

183	juvenile	♂	Chinari, Sântana de Mureș, MS	1967.09.17	skin
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Sylvia curruca (Linnaeus, 1758)

184	adult	♂	Gornești, MS	1968.04.21	skin
294	adult	?	Toldal, Voivodeni, MS	1984.05.04	skin

Sylvia atricapilla (Linnaeus, 1758)

656	adult	♀	Tîrgu Mureș, MS	2005.04.09	nat.
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Phylloscopus sibilatrix (Bechstein, 1793)

185	adult	?	Tăureni, MS	1970.04.11	skin
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Regulus regulus (Linnaeus, 1758)

400	adult	♂	Tîrgu Mureș (Cornești forest), MS	1976.01.28	nat.
401	juvenile	♀	Tîrgu Mureș (Cornești forest), MS	1976.01.28	nat.
298	adult	♂	Morești, Ungheni, MS	1981.02.03	nat.

Family Muscicapidae*Ficedula albicollis* (Temminck, 1815)

180	adult	♂	Cristești, MS	1974.04.21	skin
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Family Aegithalidae*Aegithalos caudatus* (Linnaeus, 1758)

371	adult	♂ ?	Murighiol, TL	1968.02.10	nat.
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Family Paridae*Parus palustris* Linnaeus, 1758

119	adult	?	Tofalău, Sîngeorgiu de Mureș, MS	1965.02.07	skin
120	adult	♀	Iceland, Ernei, MS	1968.03.15	skin
268	adult	♂	Tofalău, Sîngeorgiu de Mureș, MS	1977.02.11	skin
269	adult	♀	Țirgu Mureș, MS	1977.01.02	skin

Parus major Linnaeus, 1758

402	adult	♂	Găești, MS	1968.11.23	nat.
403	adult	♂	Țirgu Mureș (Stejăriș forest), MS	1968.10.16	nat.
118	adult	♀	Iceland, Ernei, MS	1968.03.15	skin

Family Sittidae*Sitta europaea* Linnaeus, 1758

121	adult	♂	Hășmașu Mare, HR	1967.08.30	skin
122	adult	?	Țirgu Mureș, MS	1959.02.27	skin
123	adult	?	Țirgu Mureș, MS	1960.11.03	skin
372	adult	♂	Tofalău, MS	1977.02.11	nat.

Family Tichodromadidae*Tichodroma muraria* (Linnaeus, 1766)

113	juvenile	♂	Piatra Unică, HR	1967.09.02	skin
114	juvenile	♂	Piatra Unică, HR	1967.09.02	skin

Family Certhiidae*Certhia brachydactyla* C. L. Brehm, 1820

396	adult	♀?	Găești, MS	1968.11.23	nat.
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Family Oriolidae

Oriolus oriolus (Linnaeus, 1758)

83	adult	♀	Sîngeorgiu de Mureș, MS	1965.08.18	skin
84	juvenile.	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin
85	juvenile.	?	Sîngeorgiu de Mureș, MS	1965.08.18	skin

Family Laniidae

Lanius collurio Linnaeus, 1758

195	juvenile	?	Sîngeorgiu de Mureș, MS	1965.08.23	skin
196	adult	♀	Sîngeorgiu de Mureș, MS	1965.08.12	skin
197	adult	♂	Sîngeorgiu de Mureș, MS	1965.08.23	skin
198	adult	♀	Sîngeorgiu de Mureș, MS	1965.08.23	skin
199	adult	♂	Sîngeorgiu de Mureș, MS	1965.08.23	skin
200	adult	♂	Ernei, MS	1965.08.18	skin

Lanius minor Gmelin, 1788

208	adult	♂	Tîrgu Mureș, MS	1966.05.22	skin
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Lanius excubitor Linnaeus, 1758

204	adult	♂	Iernut, MS	1974.10.13	skin
205	adult	♂	Iernut, MS	1972.10.29	skin
206	adult	♂	Sîngeorgiu de Mureș, MS	1972.03.08	skin
207	adult	?	Tîrgu Mureș, MS	1966.02.12	skin
209	adult	♂	Iernut, MS	1971.10.24	skin
210	adult	♂	Morești, Ungheni, MS	1970.03.15	skin
211	adult	♀	Chinari, Sîntana de Mureș, MS	1968.03.01	skin
212	adult	♀?	Morești, Ungheni, MS	1971.09.26	skin
213	adult	?	Tîrgu Mureș, MS	1966.03.18	skin
360	adult	♂	Toldal, MS	1981.12.16	nat.
361	adult	♂	Morești, Ungheni, MS	1969.09.28	nat.
387	adult	♂	Tîrgu Mureș, MS	1976.02.14	nat.
664	adult	♂?	Ercea, MS	1980.02.20	nat.

Family Corvidae

Garrulus glandarius (Linnaeus, 1758)

91	adult	♀	Tîrgu Mureș, MS	1958.03.27	skin
92	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
93	adult	?	Sîngeorgiu de Mureș, MS	1966.08.25	skin
94	adult	♂	Icland, Ernei, MS	1968.03.15	skin
95	adult	♀	Glodeni, MS	1972.03.19	skin
96	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
346	adult	♂	Chinari, MS	1975.10.19	nat.

621	adult	♂	Cerghid, MS	1988.03.23	nat.
622	adult	♂	Cerghid, MS	1988.03.23	nat.
623	adult	♂	Tirimia, MS	1988.04.17	nat.
624	adult	♀	Tirimia, MS	1988.04.17	nat.
625	adult	♀	Cerghid, MS	1988.03.26	nat.
626	adult	♂	Tirimia, MS	1988.04.28	nat.
627	adult	♂	Hărănglab, MS	1988.05.08	nat.
628	adult	♂	Onuca, MS	1990.11.25	nat.

Pica pica (Linnaeus, 1758)

97	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
98	adult	♀	Vălenii, Acățari, MS	1968.04.06	skin
612	adult	♂	Icland, MS	1968.03.12	nat.
613	adult	♂	Vidrasău, MS	1976.03.21	nat.
614	adult	♀	Săbed, MS	1979.10.21	nat.
615	adult	♀	Suveica, MS	1981.02.18	nat.
616	adult	♂	Toldal, MS	1981.12.02	nat.
617	adult	♂	Săbed, MS	1975.03.14	nat.
661	adult	?	Tîrgu Mureș, MS	1975.11.05	nat.
662	adult	?	Toldal, MS	1980.10.20	nat.

Nucifraga caryocatactes (Linnaeus, 1758)

99	adult	♂	Hășmașu Mare, HR	1968.07.02	skin
349	adult	♂	Borzont (Bucin), HR	1969.09.28	nat.

Corvus monedula Linnaeus, 1758

102	adult	♂	Iernut, MS	1974.10.13	skin
103	adult	♀?	Chinari, Sîntana de Mureș, MS	1973.10.19	skin
104	adult	♀	Icland Ernei, MS	1965.03.15	skin
105	adult	♂	Icland Ernei, MS	1965.03.15	skin
106	adult	♂	Icland Ernei, MS	1965.03.15	skin
107	adult	?	Sîngeorgiu de Mureș, MS	1965.02.21	skin
404	adult	♂	Cornești, MS	1979.04.11	nat.
609	adult	♂	Sînpaul, MS	1971.03.21	nat.
610	adult	♂	Morești, Ungheni, MS	1980.02.08	nat.
611	adult	♂	Chinari, MS	1970.04.19	nat.

Corvus frugilegus Linnaeus, 1758

374	juvenile	♀	Cristești, MS	1976.01.07	nat.
375	juvenile	♀	Cristești-Mureș, MS	1976.01.07	nat.
608	adult	♀	Berghia, MS	1976.11.10	nat.

Corvus cornix Linnaeus, 1758

100	adult	♀	Roteni, Acățari, MS	1976.06.06	skin
101	adult	♀	Roteni, Acățari, MS	1976.06.06	skin
108	adult	?	Tîrgu Mureș, MS	1958.02.24	skin
109	adult	?	Sîngeorgiu de Mureș, MS	1965.03.15	skin
110	adult	♀	Icland, Ernei, MS	1965.03.15	skin
111	adult	♂	Ungheni, MS	1967.03.23	skin
112	adult	?	Ungheni, MS	1965.02.21	skin
570	adult	♀	Tîrgu Mureș, MS	1977.02.02	skin
602	adult	♀	Săbed, MS	1980.01.18	nat.
603	adult	♀	Cristești, MS	1976.10.17	nat.
604	adult	♀	Săbed, MS	1976.11.09	nat.
605	adult	♀	Tîrgu Mureș, MS	2002.11.10	nat.
606	adult	♂	Tîrgu Mureș, MS	2002.04.23	nat.
607	adult	♀	Band, MS	1978.03.31	nat.

Corvus corax Linnaeus, 1758

350	adult	♂	Gurghiu, MS	1976.01.10	nat.
355	adult	♀	Gurghiu, MS	1976.01.10	nat.
356	adult	♀	Voiniceni, MS	1960.03.18	nat.

Family Sturnidae

Sturnus vulgaris Linnaeus, 1758

214	adult	♀	Cristești, MS	1968.03.24	skin
215	adult	?	Reghin, MS	1960.04.10	skin
216	adult	♂	Iernut, MS	1974.10.13	skin
217	adult	♂	Cristești, MS	1968.03.24	skin
218	adult	♂	Cristești, MS	1974.10.20	skin
219	juvenile	?	Ernei, MS	1965.08.18	skin
632	adult	♂	Cristești-Mureș, MS	1976.02.17	nat.
633	adult	♀	Săbed, MS	1976.03.01	nat.
634	juvenile	♂	Cefa (Oradea), BH	1995.09.02	nat.
635	adult	♂?	Chirileu, MS	1968.11.17	nat.
636	adult	♀?	Livezeni, MS	1968.09.17	nat.
638	juvenile	♂	Tîrgu Mureș, MS	1991.10.18	nat.

Family Passeridae

Passer domesticus (Linnaeus, 1758)

325	juvenile	♀?	Tîrgu Mureș, MS	2003.06.29	skin
643	juvenile	♂	Tîrgu Mureș, MS	1975.05.25	nat.
641	adult	♂	Gornești, MS	1969.11.28	nat.

Passer montanus (Linnaeus, 1758)

220	adult	?	Tîrgu Mureş, MS	1965.03.14	skin
221	adult	?	Tîrgu Mureş, MS	1965.03.14	skin
222	adult	?	Târg- Mureş, MS	1965.03.14	skin
223	adult	?	Tîrgu Mureş, MS	1965.03.14	skin
224	adult	?	Tîrgu Mureş, MS	1965.03.14	skin
225	adult	♀	Cristeşti, MS	1968.03.22	skin
324	juvenile	♂ ?	Tîrgu Mureş, MS	2003.06.30	skin
418	adult	♂ ?	Cristeşti-Mureş, MS	1976.02.17	nat.
642	adult	♂	Tîrgu Mureş, MS	1978.02.18	nat.
644	adult	♀	Cristeşti-Mureş, MS	1976.10.17	nat.

Family Fringillidae***Fringilla coelebs*** Linnaeus, 1758

229	adult	♂	Tîrgu Mureş, MS	1968.04.02	skin
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Fringilla montifringilla Linnaeus, 1758

654	adult	♂	Moreşti, Ungheni, MS	1976.01.07	nat.
655	adult	♂	Acăţari, MS	1980.02.25	nat.

Serinus mosambicus

322	adult	♂	Tîrgu Mureş	2002.02.16	skin
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Carduelis chloris (Linnaeus, 1758)

315	adult	♂	Tîrgu Mureş, MS	2000.02.01	skin
405	adult	♂	Moreşti, Ungheni, MS	1980.02.08	nat.
648	adult	♀	Tîrgu Mureş, MS	1971.02.23	nat.
232	adult	♂	Tîrgu Mureş, MS	1965.03.01	skin

Carduelis carduelis (Linnaeus, 1758)

239	juvenile	♀	Tîrgu Mureş, MS	1967.06.15	skin
240	adult	♂	Tîrgu Mureş, MS	1971.11.08	skin
241	adult	?	Tîrgu Mureş, MS	1965.03.01	skin
242	adult	?	Ernei, MS	1965.02.16	skin
243	juvenile	♀	Hăşmaşu Mare, HR	1967.08.30	skin
244	adult	♂	Cristeşti, MS	1974.10.20	skin
245	adult	♂	Icland, Ernei, MS	1968.03.15	skin
246	adult	♂	Tîrgu Mureş, MS	1971.11.08	skin
377	adult	♂	Sîngeorgiu de Mureş, MS	1968.11.26	nat.

Carduelis spinus (Linnaeus, 1758)

230	adult	♂	Ernei, MS	1965.02.16	skin
231	adult	♂	Sîngeorgiu de Mureș, MS	1965.02.16	skin
316	juvenile	?	Tîrgu Mureș, MS	2000.10.20	skin

Carduelis cannabina (Linnaeus, 1758)

233	adult	♀?	Sîngeorgiu de Mureș, MS	1972.10.26	skin
234	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
235	adult	♂	Sîngeorgiu de Mureș, MS	1972.11.17	skin
236	adult	♀	Ernei, MS	1965.02.16	skin
237	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
238	adult	♂	Tîrgu Mureș, MS	1972.03.01	skin
364	adult	♂	Cristești-Mureș, MS	1976.01.07	nat.
365	adult	♂	Cristești-Mureș, MS	1976.01.07	nat.
267	adult	♀	Fărăgău, MS	1977.02.22	skin
619	adult	♂	Toldal, MS	1980.01.10	skin
645	juvenile	♂	Iernut, MS	1985.10.31	nat.
646	juvenile	♂	Iernut, MS	1985.10.31	nat.
649	adult	♂	Fărăgău, MS	1977.02.22	nat.

Carduelis flavirostris (Linnaeus, 1758)

226	adult	♀	Tîrgu Mureș, MS	1970.06.17	skin
227	adult	♀	Tîrgu Mureș, MS	1970.05.27	skin
299	adult	♂	Tîrgu Mureș, MS	1969.12.27	nat.
618	adult	♂	Cristești-Mureș, MS	1978.02.11	skin
650	adult	♀	Tîrgu Mureș, MS	1970.06.10	nat.
651	adult	?	Tîrgu Mureș, MS	1995.01.08	nat.

Carduelis flammea (Linnaeus, 1758)

228	adult	♂	Tîrgu Mureș, MS	1973.03.04	skin
363	adult	♂	Tîrgu Mureș, MS	1976.02.05	nat.

Loxia curvirostra Linnaeus, 1758

280	adult	♀	Hășmașu Mare, HR	1967.08.30	skin
281	adult	♂	Hășmașu Mare, HR	1967.08.30	skin
282	adult	♀	Hășmașu Mare, HR	1967.08.30	skin
283	adult	♂	Hășmașu Mare, HR	1967.08.30	skin

Pyrrhula pyrrhula (Linnaeus, 1758)

270	adult	♂	Tîrgu Mureș, MS	1971.02.23	skin
271	adult	♂	Tîrgu Mureș, MS	1971.02.15	skin

272	adult	♂	Reghin, MS	1960.04.10	skin
273	adult	♂	Sîngeorgiu de Mureș, MS	1972.11.18	skin
274	adult	♂	Tîrgu Mureș, MS	1965.01.18	skin
275	adult	♀	Tîrgu Mureș, MS	1965.03.01	skin
321	adult	♂	Deda, MS	2002.01.25	skin
323	adult	♂	Tîrgu Mureș, MS	2002.02.15	skin
391	adult	♂	Vidrasău, MS	1968.01.14	nat.
392	adult	♂	Viforoasa, MS	1967.11.10	nat.
393	adult	♂	Toldal, Voivodeni, MS	1991.01.30	nat.

Coccothraustes coccothraustes (Linnaeus, 1758)

276	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
277	adult	?	Sîngeorgiu de Mureș, MS	1965.02.07	skin
278	adult	♂	Tîrgu Mureș, MS	1968.04.02	skin
279	adult	♂	Reghin, MS	1972.11.12	skin
300	adult	♂	Morești, Ungheni, MS	1991.02.15	skin
637	adult	♂	Toldal, MS	1980.01.06	nat.

Family Emberizidae

Emberiza citrinella Linnaeus, 1758

251	adult	♀	Chinari, Sântana de Mureș, MS	1974.02.11	skin
252	adult	♀?	Gornești, MS	1968.03.17	skin
253	adult	♂	Chinari, Sântana de Mureș, MS	1975.01.14	skin
254	adult	♂	Chinari, Sântana de Mureș, MS	1974.02.11	skin
255	adult	♂	Chinari, Sântana de Mureș, MS	1974.02.11	skin
256	adult	♀	Sîngeorgiu de Mureș, MS	1971.03.04	skin
257	adult	♀	Sîngeorgiu de Mureș, MS	1965.02.21	skin
258	adult	♂	Sîngeorgiu de Mureș, MS	1972.10.29	skin
259	adult	♀	Icland, Ernei, MS	1968.03.15	skin
260	adult	♂	Sîngeorgiu de Mureș, MS	1965.02.21	skin
266	adult	♂	Tofalău, Sîngeorgiu de Mureș, MS	1977.02.11	skin
287	adult	♀	Păingenii, Glodeni, MS	1982.03.23	skin
291	adult	♀?	Păingenii, Glodeni, MS	1981.02.20	skin
292	adult	♀	Păingenii, Glodeni, MS	1981.02.20	skin
369	adult	♂	Cristești-Mureș, MS	1976.01.07	nat.
620	adult	♂	Tîrgu Mureș, MS	1979.12.28	skin
639	adult	♀	Tîrgu Mureș, MS	1979.12.28	nat.

Emberiza cia Linnaeus, 1766

261	adult	♂	Tofalău, Sîngeorgiu de Mureș, MS	1965.02.07	skin
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Emberiza schoeniclus (Linnaeus, 1758)

247	adult	♂	Morești, Ungheni, MS	1966.04.10	skin
248	adult	♂	Cristești, MS	1968.03.24	skin
249	adult	♂	Sîngeorgiu de Mureș, MS	1971.03.04	skin
250	adult	♂	Iernut, MS	1970.04.02	skin
286	adult	♂	Fărăgău, MS	1982.02.09	skin
647	adult	♀	Țîrgu Mureș, MS	1976.02.05	nat.

Emberiza calandra Linnaeus, 1758

262	adult	♀	Morești, Ungheni, MS	1966.03.27	skin
263	adult	♀	Gornești, MS	1966.03.20	skin
264	adult	?	Gornești, MS	1968.10.13	skin
265	adult	♀	Fărăgău, MS	1977.02.02	skin
652	adult	♂ ?	Țîrgu Mureș, MS	1968.01.14	nat.

Abbreviations: nat.= naturalized, ? = unclear

REFERENCES

1. Antal, V., 1968, Păsările răpitoare din Țîrgu-Mureș (Die Greifvögel von Neumarkt a.M.), *V.P.S.*, **20** (4): 23.
2. Cernei, Ana-Maria Daniela, 2007, *Contribuții la cercetarea ecohidrologică și protecția lacului Fărăgău*, Baia Mare: 1–215.
3. Gombos, Atilla, 1973, Occurrence of a Further Proving Specimens of the Knot (*Calidris canutus*) in Roumania, *Aquila*, **76-77**: 192.
4. Gombos, Atilla, 1979–1980, Călfarul alb (*Tadorna tadorna* L.) în avifauna Transilvaniei în perioada anilor 1800-1979 (*Tadorna tadorna* L. dans l'avifaune de Transylvanie 1800-1979), *Stud. Com. Reghin*, **1**, 123–130.
5. Kalabér, L. & Szombath, Z., 1972, Contribuții la cunoașterea biologiei pescărelului negru (*Cinclus cinclus* L.) (Beiträge zur Kenntnis der Biologie der Wasserramsel), *Ocot. Nat.*, **16** (2): 213–216.
6. Klemm, Werner und Kohl, Stefan, 1988, *Die Ornithologie Siebenbürgens*, **band III**, Böhlau Verlag Köln Wien.
7. Kohl, St. & Gombos, A., 1969, Erstes Belegstück vom Küstenstrandläufer für Rumänien, *Falke*, **16** (7): 242–243.
8. Kohl, St. & Kiss, J.B., 1973, Leziuni, fracturi și anomalii la oasele păsărilor (Verletzungen, Brüche und Anomalie an Vogelknochen), *Peuce*, **III**: 633–641.
9. Kohl, St., Szombath, Z., Kónya, St., Gombos, A., 1975, Uferschwalbenkolonien (*Riparia riparia* L.) entlang des Mureș-Flusses, *Nymphaea*, **III**: 191–200.
10. Kohl, St. Szombath, Z., Kónya, I., 1983, Coloniile de *Riparia riparia* (L.) de-a lungul Mureșului (II) *Marisia*, **XI–XII**, Țîrgu-Mureș: 183–185.
11. Kohl, Stefan, Szombath, Zoltán, Kónya, István, Lörincz, István, Libus, András, Szombath, István, 1995, The Birds of the Mureș (Maros) River, *TISCIA monograph series, The Maros / Mureș River Valley, Szolnok – Szeged – Țîrgu Mureș*: 235–244.
12. Kónya, István, 1983, Rața neagră (*Melanitta nigra* L.) la Țîrgu Mureș. (Trauerente (*Melanitta nigra* L.) bei Țîrgu Mureș), *Marisia, Țîrgu-Mureș*, **XI–XII**: 141–143.
13. Kónya, István, Kelemen, Attila, 1983, Apariția raței cap-negru (*Aythya marila* L.) lângă Țîrgu Mureș. (Vorkommen der Bergente (*Aythya marila* L.) bei Țîrgu Mureș), *Marisia, Țîrgu-Mureș*, **XI–XII**: 145–150.
14. Kónya, István, 1972, Malformații constatate la ciocul unor păsări (Vervormung der Schnäbel bei Vögeln), *Stud. Mat. Țîrgu Mureș*, **III–IV**: 1–16.
15. Rékási, József, Szombath, Zoltán, 2000, A Marosvásárhelyi Természettudományi Múzeum Mallophaga gyűjteménye, *Múzeumi Füzetek, Kolozsvár*: 112–123.
16. Szabó, M., Attila, Szabó, M., Erzsébet, 1992, *Dicționar de localități din Transilvania*, Ed. Kriterion, București, 250 p.
17. Szabó-Szeley, L., Baczó, Z., 2006, Nomenclatorul Păsărilor din România – *Nomenclator Avium Romaniae*, Ed. AVES, Odorheiu Secuiesc, 117 p.

18. Szombath, Z.& Antal, L., 1972, Observații ornitologice de-a lungul Mureșului, între Tîrgu Mureș și Pecica (județul Arad) 1970. (Ornitologische Beobachtungen entlang des Mieresch zwischen Neumarkt a. M. Und Pecica (Kreis Arad, 1970). *Stud. Mat. Tîrgu Mureș*, **III–IV**: 27–42.
19. Szombath, Zoltán, Colecția de schelete parțiale de păsări a Muzeului Județean Mureș, Târgu-Mureș, (*manuscript*).
20. Szombath, Zoltán, Szabó, József, 1997, Avifauna eleșteelor de la Iernut (jud. Mureș) în primii 5 ani de la amenajarea lor, *Marisia*, Tîrgu Mureș, **XXV**: 439–454.
21. www.faunaeuropaea.org

COLECȚIA ORNITOLOGICĂ A MUZEULUI JUDEȚEAN MUREȘ
(SECȚIA DE ȘTIINȚELE NATURII)
(Rezumat)

Lucrarea prezintă colecția ornitologică a Secției de Științele Naturii, din cadrul Muzeului Județean Mureș. Această colecție cuprinde un număr de 667 exemplare naturalizate sau sub formă de balg. Pentru fiecare specie este menționat numărul de inventar, vârsta, sexul, data și locul colectării, precum și modul de preparare.

PALEONTOLOGY

THE PALEONTOLOGICAL COLLECTION “ION STĂNOIU” FROM THE PATRIMONY OF THE MUSEUM OF OLTENIA, CRAIOVA

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Abstract: The paleontological collection “Ion Stănoiu” has become part of the patrimony of the Natural Sciences Branch of the Museum of Oltenia Craiova, in March 1955. The collection had been sold to the museum by Professor at the University of Craiova Dr. Ion Stănoiu (1927–2008), well-known for his papers about the butterflies in Oltenia. The 150 fossil samples represent a small collection compared to the number of items present in other collections of the museum. The particular value of this collection lies in the remarkable variety of its components, both from the systemic point of view as well as of the wide stratigraphic time span documented by these representatives. In the collection inventory one can find fossil plants, protozoa, graptolites, trilobites, corals, brachiopods, echinoids, worms, gastropods, bivalves, ammonites, belemnites, fish and mammals. Therefore, the fossils in the collection “Ion Stănoiu” cover almost every level of the Palaeozoic, of the Mesozoic and of the Cenozoic. The great systemic variety and the large temporal range have determined along the time, the use of numerous samples of this collection for most of the paleontological exhibitions of the Natural Sciences Branch (currently the Natural Sciences Office) in the Museum of Oltenia. Between 1988 and 2004, the Stănoiu collection has known a continuous period of display, many of its components being selected to take part in the permanent exhibition “The Evolution of Life”.

Keywords: paleontological collection, Museum of Oltenia Craiova.

Introduction

Ion Stănoiu (1927–2008) graduated from the elementary school and then from high-school in his home town Craiova, then from the Faculty of Biology in Cluj. His teaching career involved the level of high-school and a position at the University of Craiova. He obtained his doctoral degree with the thesis “Tortricids from Oltenia” and has accomplished in the course of 30 years a complex study on the Lepidoptera in Oltenia, disseminated in over 50 papers and 4 books.

Through exchanges with 30 states and as a result of two expeditions (in China and Siberia), he has put together two collections of local and exotic butterflies, later donated to the Museum of Oltenia and to the National College “Carol I” in Craiova. While a student in Cluj, he collected fossils during his field trips, and afterwards he has continued enriching his collection by making exchanges and by discoveries made in the fossiliferous locations in Oltenia. The collection thus constituted was purchased by the Museum of Oltenia in March 1955, and it has been considered,

since then, one of its quite important collections. The collection is extremely varied, both from the systemic point of view and as far as the geological age of the samples is concerned.

Material and methods

For this paper 150 items of the “Ion Stănoiu” collection were available. Actually, the samples are deposited on the shelves of the Paleontology storeroom of the Museum. In the general inventory record of the Natural Sciences Office, these samples are registered at the inventory numbers 1318–1445. The fossil samples are in a good conservation state, over 140 of them being ready to be displayed.

I checked the denominations of the species and, in certain cases, I have updated them. For this purpose I used specific references [1], [2], [3], [4], [5] as well as some websites [6], [7], [8]. I carried on with the systematic sorting of the species and I arranged them according to the geological age of each one.

Results and discussions

The Palaeontology Collection of the Museum of Oltenia is one of the collections which were the starting point for the museum, in 1915. The first samples came from the collection called “Alexandru and Aristia Aman”. These were two Maecenas of Craiova who practically donated their entire heritage to the state, thus contributing to the foundation of the Museum of History and Ethnography, of the Art Museum and of the County Library. In time, the collection was enlarged, reaching over 16000 items through acquisitions, donations, getting in, discoveries, research etc.

Table 1: The Paleontology Collection of the Museum of Oltenia

COLLECTION	NO. OF ITEMS
Ion STĂNOIU	150
Ion PĂTRUȚOIU	1012
Ana MALOȘ	189
Titus BRUSTUR	34
BAIA DE FIER	1009
DONATIONS – GETTING IN BUGIULEȘTI	3653
MAMMAL AND MOLLUSK SAMPLES	7700
GETTING IN AND DONATIONS TO THE MUSEUM	2 593
TOTAL	16340

A short glimpse on the structure of paleontological patrimony of the museum (Table 1) leads to the conclusion that, taking into account the number of samples, the collection titled “Ion Stănoiu” is a small one – even the penultimate in rank. The volume of samples is also rather small – so that all the items could fit into a recipient of less than 1 m³. Nevertheless, I state that we are in the presence of a truly valuable paleontological collection, and this value could be synthesized in one word: diversity.

From the systemic point of view, the collection is extremely varied, including:

- plants – 10 species: *Conocoryphes sulzeri*, *Graptolithes bohemicus*, *Calamites suckovii*, *Pecopteris* sp., *Lepidodendron aculeatum*, *Sphaenophyllum emarginatum*, *Odontopteris* sp., *Neuropteris* sp., *Syringodendron* sp., *Alethopteris dentata*;
- invertebrates – 110 species belonging to the following groups:
 - protozoa: *Nummulites perforatus*, *N. intermedia*;
 - graptolithes: *Bohemograptus bohemicus*;

- trilobites: *Conocoryphes sulzeri*;
- corals: *Thecosmilia trichotoma*, *Calamopora spongites*, *Autopora serpens*;
- brachiopods: *Terebratula reticularis*, *T. fumanensis*, *Pectunculus obovatus*, *Rhynchonella* sp. etc.;
- echinoids: *Pentacrinus cingulatus*, *Schizaster ambulacrarium*, *Laganum transilvanicum*, *Euspatangus hainaldi*, *Echinolampas gigas* etc.;
- worms: *Serpula spirulea*, *S. dilatata*;
- gastropods: *Actaeonella* sp., *Bellerophon* sp., *Actaeonella* sp., *Phasionella scalaroides*, *Rostellaria gigantea*, *Cerithium margaritaceum*, *Turritella fuscata*, *Conus fuscocingulatus*, *C. vindobonensis*, *Trochus patulus*, *Mitra cupresina* etc.;
- bivalves: *Pectunculus obovatus*, *Diceras arietinum*, *Gryphaea ornata*, *Isocardia striata*, *Pecten solen*, *Spondyllus bifrons*, *Cardium granuloseum*, *C. gigas*, *Arca diluvii*, *Venus multilamella*, *Lucina dujardini*, *Ostrea flabellula*, *O. gigantea* etc.
- scaphopods: *Dentalium michelotti*;
- ammonites: *Ammonites triplicatus*, *Ammonites* sp.;
- belemnites: *Belemnites* sp.
- vertebrates 9 species.
 - fish: *Girodus* sp., *Placodus* sp., *Carcharodon gracilis*, *Meletta sardinites*, *Meletta* sp., *Clupea crenata*,
 - mammals: *Halitherium* sp.

In a synthetic graphic presentation, the systemic repartition of the samples in the “Ion Stănoiu” collection looks like in fig. 1.

The sample repartition according to paleontological ages is also extremely varied, from Palaeozoic to late Pliocene: *Conocoryphes sulzeri* – Cambrian, *Orthoceras* sp. – Ordovician, *Bohemograptus bohemicus* – Silurian, *Neuropteris* sp. – Carboniferous, *Encrinurus liliiformis* – Triassic, *Diceras arietinum* – Jurassic, *Hyppurites* sp. – Cretaceous, *Nummulites perforatus* – Eocene, *Carcharodon gracilis* – Oligocene, *Pyrulla condita* – Miocene, *Meletta sardinites* – Pliocene etc.

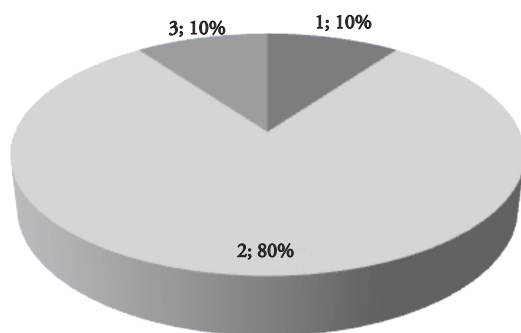


Fig. 1: The systemic structure of the “Ion Stănoiu” collection: 1 – plants; 2 – invertebrates; 3 – vertebrates.

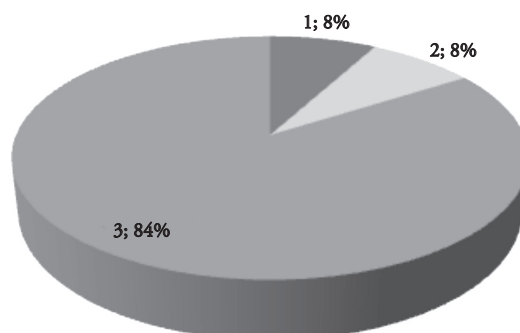


Fig. 2: The repartition according to the geological age of the samples in the “Ion Stănoiu” collection: 1 – Palaeozoic; 2 – Mesozoic; 3 – Neozoic.

One of the functions fulfilled by the museum as an institution is the valuation of samples by display. The items in the collection under discussion have been plentifully used for paleontological exhibitions and also for illustrating some activities typical for museums: conferences, presentations, meetings with the public etc.

The great systemic variety had as a consequence that many samples of this collection were used along the time in setting up most of the paleontological exhibitions of the Natural Sciences Section (currently the Natural Sciences office) of the Museum of Oltenia. Between 1988 and 2004, this collection has known its true “glory”, many of its component elements having been selected

to be a part of the exhibition called “The Evolution of Life”. The only big disadvantage of this collection is given by the fact that the place of origin remains unknown for virtually all the samples.

Conclusions

Out of the data presented so far with respect to the paleontological collection known as “Ion Stănoiu”, we can infer the following conclusions: i. the collection has a small number of items – namely, 150; ii. it has extreme systemic diversity and large stratigraphic range of samples; iii. due to its diversity, it is suitable for a large spectrum of exhibitions focusing on fossils, as well as for certain activities typical for museums: conferences, presentations etc; iv. although the elements making up the collection are well preserved, with respect to many of them the place of origin is unknown, which represents a major inconvenient.

In final analysis, I can conclude that “Ion Stănoiu” is a collection which can be deemed desirable for any museum.

REFERENCES

1. Hanganu, E., Manoliu, E., Grigorescu, D., Dragomir, B., 1982, *Paleontologie. Lucrări practice*, Tipografia Universității din București: 1–289.
2. Hoestlandt, H., 1991, *The freshwater fishes of Europe: Clupeidae, anquillidae*, AULA-Verlag, Graz: 1–447.
3. Macarovici, N., Turculeț, I., 1972, **Paleontologia stratigrafică a României**, Ed. Tehnică, București: 1–264.
4. Mander, L., Twitchett, R. J., 2008, *Quality of the triassic-jurassic bivalve fossil record in Northwest Europe*, *Palaeontology*, Volume **51**, Number **6**: 1213–1223.
5. Thomel, G., 1980, *Ammonites*, Ed. Serre, Nice: 1–227.
6. The Paleobiology Database <http://paleodb.org/cgi-bin/bridge.pl> accessed July 20, 2010.
7. **Palaeos Paleozoic: Ordovician**: The Middle **Ordovician**, <http://www.palaeos.com/Paleozoic/Ordovician/MidOrd.html> accessed at July 25, 2010.
8. Archerd **Shell** Collection, <http://shells.tricity.wsu.edu/ArcherdShellCollection/GastropodClassification.html> accessed at August 12, 2010.

COLECȚIA PALEONTOLOGICĂ „ION STĂNOIU” DIN PATRIMONIUL MUZEULUI OLTENIEI CRAIOVA (Rezumat)

Colecția paleontologică “Ion Stănoiu” a intrat în patrimoniul Secției de Științele Naturii a Muzeului Olteniei Craiova în martie 1955. Colecția a fost vândută muzeului de către domnul dr. Ion Stănoiu (1927–2008), profesor la Universitatea din Craiova, cunoscut pentru lucrările sale despre fluturii din Oltenia.

Cele 150 de piese fosile constituie o colecție mică raportat la numărul celor cuprinse în alte colecții ale muzeului. Valoarea colecției constă în marea varietate a pieselor componente, atât din punct de vedere sistematic, cât și din cel al vârstei geologice.

În inventarul colecției întâlnim plante (de exemplu ferigi arborescente – *Lepidodendron aculeatum*), protozoare (numuliți – *Nummulites intermedia*), graptoliți (*Bohemograptus bohemicus*), trilobiți (*Conocoryphes sulzeri*), corali (*Calamopora spongites*), brahiopode (*Terebratula reticularis*), echinide (*Pentacrinus cingulatus*), viermi (*Serpula spirulea*), gastropode (*Actaeonella* sp.), bivalve (*Pectunculus obovatus*), amoniți (*Ammonites triplicatus*), belemniti (*Belemnites* sp.), pești (Girodus sp.) și mamifere (*Halitherium* sp.).

Practic, fosilele din colecția „Ion Stănoiu” acoperă aproape fiecare perioadă a Paleozoicului, Mezozoicului și Neozoicului: *Conocoryphes sulzeri* – Cambrian, *Orthoceras* sp. – Ordovician, *Graptolithes bohemicus* – Silurian, *Neuropteris* sp. – Carbonifer, *Encrinus liliiformis* – Triasic, *Diceras arietinum* – Jurassic, *Hyppurites* sp. – Cretacic, *Nummulites perforatus* – Eocen, *Carcharodon gracilis* – Oligocen, *Pyrulla condita* – Miocen etc.

Marea varietate sistematică și vastă acoperire temporală a făcut ca numeroase piese din această colecție să fie folosite de-a lungul timpului la realizarea majorității expozițiilor de paleontologie ale Secției de Științele Naturii (actualmente Serviciul Științele Naturii) a Muzeului Olteniei. Între 1988 și 2004, colecția Stănoiu a cunoscut o perioadă continuă de expunere, multe dintre piesele componente fiind selectate pentru a face parte din expoziția permanentă „Evoluția vieții”.

MUSEUM PEDAGOGY

THE EUROPA NOSTRA 2010 EDUCATION AWARD – EUROPEAN ADDED VALUE

Dana Roxana HRIB

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Abstract: In the year 2010, the Brukenthal National Museum was the first museum in Romania to receive a European Union Prize for Cultural Heritage, namely the Europa Nostra Awards, the 4th category: Education, Training and Awareness-raising; the awarded programme was a museum pedagogy one, entitled “Discovering the Museum”.

The programme was launched at the beginning of school year 2008/2009 (15th of September 2009 – 15th of June 2008). At present, its second year is running for 2009/2010.

The audience of the project was considerable under the respect of participants, all paying more than one visit to the Museum, while the community response to the Museum’s youth educational project equaled the audience in schools. The main patterns of the project were set during the school year 2008/2009 in which concern the activity types, publication concepts, establishment of relations with schools and other institutions education-related through the means of written agreements. There were also established rules of participation, means of information, and means of popularizing the results. As far as we know, the Brukenthal National Museum was the first in Romania to publish a guide to the exhibition for students, the first to issue museum-applied activity books for children and the first to publish a catalogue on students’ exhibition.

Keywords: Brukenthal National Museum, Europa Nostra Award.

The Brukenthal National Museum of Sibiu, Romania, was opened to the public in 1817, being the first museum on the today’s Romanian territories. The Museum was named after its founder – Baron Samuel von Brukenthal (1721–1803), who built an impressive Baroque palace in Sibiu, in which location the Museum established its beginnings. Initially presenting von Brukenthal’s collection of European Painting in one single building, today the Museum shelters a large diversity of valuable collections in 9 buildings. During the period between 2006 and 2008, the Museum was subjected to a spectacular transformation, all the buildings in its administration being renovated while about 85% of the exhibitions were reconsidered.

Before 2006 Museum’s education activities were random. Because of the renovation process paralleled by the events of Sibiu European Capital of Culture in 2007, an articulate educational programme was possible to be run only starting with school year 2008/2009.

The education rooms in the Museum were opened in 2007 at the Museum of Natural History and in 2008 at the Brukenthal Palace (Art Galleries) and the Museum of History (Fig. 1). The Brukenthal National Museum comprises the Brukenthal Palace (European Art Galleries), the Romanian Art Gallery, the Contemporary Art Gallery, the Brukenthal Library, the Museum of Natural History, the Museum of Pharmacy, the Museum of Hunting, the Museum of History and the Restoration Laboratories.

The “Discovering the Museum” programme was launched at the beginning of school year 2008/2009 (15th of September 2009 – 15th of June 2008). At the moment, its second year is running for 2009/2010.

Scope of the project: aims and objectives

On short term, the Brukenthal National Museum aimed at encouraging students of different groups of age to become familiar with the Museum through recurrence in visiting, to discover it step by step, having the possibility of learning, being creative and enjoying in recreation.

On medium term, the Museum aimed at a different approach to the Sibiu community through the means of creating events dedicated to children and teenagers, involving teachers, parents, press, other institutions.

On long term, the Museum aims at serving as model for other museums in Romania, in order to form through today's children and students the future museum-oriented public, which at the moment doesn't exist at the national level.

Stages of implementation

1. Dissemination

The broad educational offer for the school year 2008/2009 (a step-by-step activities timeline comprising 57 themes and eight projects) was disseminated at all urban or rural levels, being handed over to schools and to the County School Inspectorate under the form of printed materials. For the school year 2009/2010, the offer is structured in accordance with the target group on three categories: primary, secondary and high school. The educational offer it is also posted on the education page of the official website of the museum <http://www.brukenthal-museum.ro/educatie>, the events related to the education activities are announced on news and events web page and Museum's press releases, the exhibitions being posted on the temporary exhibitions page (Fig. 2).

Establishing the activity categories

The Museum educational offer includes basic guided tours, thematic guided tours, thematic projects, contests, workshops, exhibitions, guided tours for disable children and their parents, ethnic and ecumenical oriented activities.

Strategies

The main patterns of the project were set during the school year 2008/2009 in which concern the activity types, publication concepts, establishment of relations with schools and other institutions education-related through the means of written agreements. There were also established rules of participation, means of information, and means of popularizing the results.

The main strategy was to focus on what the museum in general and the Brukenthal National Museum in particular has characteristic. On the other hand, the educational project was thought to respond to the needs of institutions involved, accommodating their own specificity.

Partners

Until the end of year 2009, the project involved the participation of 11 high schools in the city of Sibiu, 2 urban high schools in Sibiu County, 13 schools (primary & secondary teaching) in the city of Sibiu, 2 urban schools (primary and secondary teaching) in Sibiu County,

7 rural schools (primary and secondary teaching) in Sibiu County, 9 kinder gardens in the city of Sibiu, 1 urban kinder garden in Sibiu County, 1 rural kindergand in Sibiu County.

The Brukenthal National Museum also enjoyed as partners in education activities the “Grigore Antipa” Museum of Bucharest, Grupo de Gestevores Patrimonio Cultural Latino-Americano of Buenos Aires and the National University of Comahue Argentina for the project “Discovering the Dinosaur” (2008), the German Cultural Forum in Sibiu for several workshops (2008 and 2009), the Calvinist Parish in Sibiu for an exhibition project (2008), the Twinning Association Rennes Sibiu (temporary exhinition of year 2009 related activities), the Caleidoscop Centre for Autistic Children.

Results

The audience of the project was considerable under the respect of participants, summing a total of 1587 visits, 2 thematic projects and 2 exhibitions in 2008, 7341 visits, 34 thematic projects and 7 exhibitions in 2009 and 13478 visits, 19 thematic projects and 6 exhibitions in the first semester of year 2010.

The records of the visits, number of participating students, activities, projects and exhibitions, dated and mentioning the school, the name of the teacher leading the group and the guiding person are posted on the education web page of the Museum’s site. There is also an archive for the 2008 and 2009 records.

The community response to the Museum’s youth educational project equaled the audience in schools, the events of prizes awarding or exhibition openings were mediatized through over 40 television and radion news and 100 newspaper articles.

Publications

Until present, the Museum issued six publications for students of different groups of age: guided books to the permanent exhibitions of Brukenthal Palace (1st ed. 2008, 2nd ed 2009, sold in 2000 copies) and the Museum of Natural History (2009) for secondary and high school students, activity books to the Brukenthal Palace and the Museum of History (2009) for primary school students and an exhibition catalogue promoting the works of art school students¹ (Fig. 4 a/b).

As far as we know, the Brukenthal National Museum is the first in Romania to publish a guide to the exhibition for students, the first to issue museum-applied activity books for children and the first to publish a catalogue on students’ exhibition.

European added-value

The European added-value consists in the new approach regarding youth education in the museum on a school-museum relation basis.

As the general museum practice is to present an exhibit and encourage students to draw and comment upon the subject afterwards, the main strategy of “Discovering the Museum” programme was to focus on what the museum in general and the Brukenthal National Museum in particular has characteristic.

1. Dana Roxana Hrib, *Palatul Brukenthal: Ghidul pentru elevi*, ed I (Sibiu, Altip, 2008)
Dana Roxana Hrib, *Îngeri: catalog de expoziție* (Sibiu, Altip, 2008)
Dana Roxana Hrib, *Palatul Brukenthal: Ghidul pentru elevi*, ed II (Sibiu, Altip, 2009)
Dana Roxana Hrib, *Poveștile Palatului Brukenthal: îndrumar de pedagogie muzeală cl. I–IV* (Sibiu, Altip, 2009)
Anamaria Tudorie, D. R. Hrib, *O călătorie în timp la Muzeul de Istorie: îndrumar de pedagogie muzeală cl. I–IV* (Sibiu, Altip, 2009)
Rodica Ciobanu, Gabriela Cuzepan, *Muzeul de Istorie Naturală: Ghidul pentru elevi* (Sibiu, Altip, 2009)

Under this respect, the young generation was thought what a museum is: exhibitions, collections, storages, conservation and restoration were the main topics to be explained before referring to a particular item.

The step by step process of discovering the museum moved from general to particular, from what is to be visited to what it is beside the closed doors. The students were invited to become little museum workers organizing their own collections and making their own exhibitions.

In response to the needs of institutions involved, in order to accommodate their own specificity, "Discovering the Museum" programme included training stages for teachers, facilitated the practice of pedagogy and art high school students and promoted the creation of art students and theater students inside and outside the Museum's galleries.

There were also activities accommodating the persons with special needs, the project also involving the visits of kinder gardens and school with developmental disability profile.

The intercultural dialogue and cultural diversity were promoted through special events for Romani students and the ecumenical pattern of some of the projects as the *Angels* exhibition comprising works done by Eastern Orthodox students, inspired by Catholic paintings and exhibited in a Calvinist church.

Scientific communications

Although a young programme involving a short but complex practice, "Discovering the Museum" offered the ideal basis of scientific study, since its launching 7 scientific communications² being defended at national and international symposiums and 5 articles published (the present one included)³.

Prizes

In the year 2010, the Brukenthal National Museum was the first museum in Romania to receive a European Union Prize for Cultural Heritage/Europa Nostra Awards, the 4th category: Education, Training and Awareness-raising with the museum pedagogy programme "Discovering the Museum" (Fig. 5 a/b).

2. Dana Hrib, *Strategies in Museum learning*. Muzeul Satului „D. Gusti” București (14–17.V.2009) – The European Conference on Youth Education in Museums.

Dana Hrib, *Descoperind Muzeul* [Discovering the Museum] Muzeul Literaturii Române Iași (7–8.X.2009) – The National Symposium on History, Culture and Heritage.

Raluca Teodorescu, *Poveștile Muzeului Național Brukenthal: Program de practică pedagogică și pedagogie muzeală* [The stories of Brukenthal National Museum: A programme of pedagogy praxis and museum pedagogy], Ministerul Culturii și Patrimoniului Național, București – „Educația muzeală – obiectiv prioritar în muzee” (9–10.XI.2009).

Rodica Ciobanu, *Geological education in museums*, Universitatea Babes Bolyai Cluj Napoca – 16th Annual Meeting of the Association of European Geological Societies (9–13.VII.2009).

Anamaria Tudorie, Raluca Teodorescu, *A ludic approach of macabre thematic in museum education activities*, The International Congress of Art Macabre, Sibiu, (20–22.V.2010).

Rodica Ciobanu, *Educația geologică și patrimonial cultural*, Muzeul Județean Mureș, Târgu Mureș (20–21.X.2010) – Sesiunea Internațională de Comunicări Științifice.

Dana Hrib, *Premiul Europa Nostra pentru Educație 2010 – Contribuții Europene*.

3. Dana Hrib, 'The Brukenthal National Museum: Strategies in Museum Learning' in *The Romanian Journal of Museums*, 2/2009.

Rodica Ciobanu, *Geological education in museums. Case study: The Brukenthal National Museum*, Studia Universitatis Babeș Bolyai, Geologia, Special Issue, MAEGS–16 (Cluj-Napoca, 2009).

Dana Hrib, 'Museum Pedagogy – A Successful Programme' în *Acta Terrae Septemcastrensis* IX, 2010.

Anamaria Tudorie, Raluca Teodorescu, 'A ludic approach of macabre thematic in museum education activities' în *Actes du XIV^{ème} Congrès International d'Etudes sur les DANSES MACABRES et l'Art Macabre en General* (C. Bogdan, S Marin-Barutcieff ed., Ed. Universității din București, 2010).

PREMIUL EUROPA NOSTRA PENTRU EDUCAȚIE 2010 – CONTRIBUȚII EUROPENE (Rezumat)

Programul educațional „Descoperind Muzeul” a fost lansat în Muzeul Național Brukenthal din Sibiu în luna Septembrie, anul 2008 și a fost distins cu premiul Uniunii Europene pentru Patrimoniu Cultural *EUROPA NOSTRA 2010* la categoria 4: Educație, Instruire și Conștientizare.

Între rezultatele programului pot fi enumerate cele ale anului 2008 (1587 vizite, 63 activități, 3 proiecte, 2 expoziții, 14 parteneri), ale anului 2009 (7341 vizite, 382 activități, 34 proiecte, 7 expoziții, 61 parteneri) și ale semestrului I al anului curent (13478 vizite, 652 activități, 19 proiecte, 6 expoziții, 68 parteneri). La acestea se adaugă 6 publicații pentru toate grupurile de vârstă școlară, 7 comunicări la sesiunile de comunicări naționale și internaționale și 5 articole științifice pe teme educative.



Fig. 1: Education room

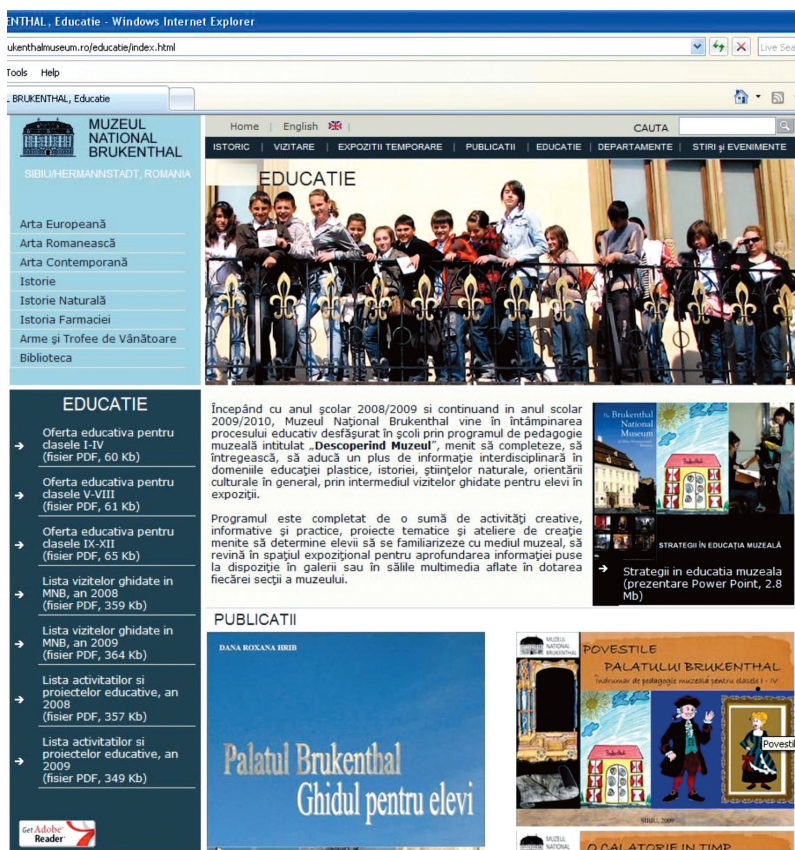


Fig. 2: Brukenthal National Museum education web page



Fig. 3 a/b: Pedagogy and art praxis in the Museum

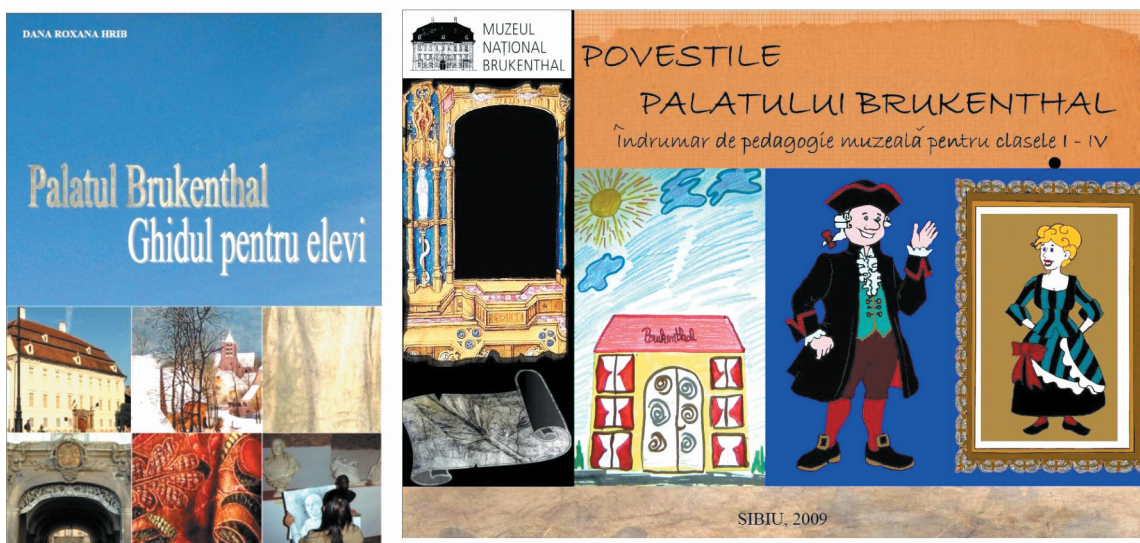


Fig. 4 a/b: Publications for students



Fig. 5 a/b: The Europa Nostra Diploma and Trophée

THE PEDAGOGICAL MUSEUM PROGRAMME “THE EUROPEAN BATS NIGHT”

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Abstract: The Natural Science Museum from Târgu-Mureș has developed between August and October 2009 a teaching museological programme called “European bats night”. The idea of such an activity has come from the temporary exhibition “Bats between science and legend”, itinerated by the Danube Delta Ecotourism Museum Center from Tulcea, from the dioframe, representing a cave, as part of the fundamental museum’s exhibition and also from the event “European Bats Night”, celebrated every year between August and September in European countries, in order to attract the public attention upon the jeopardizing the bats population.

This particular programme has included three different phases: the documentation, the creation and the evaluation. In this process were involved six classes: the fifth and eighth graders from “Alexandru Papiu Ilarian” National College from Târgu-Mureș and also the fourth graders from “Europa” Elementary School from Târgu-Mureș.

Keywords: dioframe, European Bats Night, master plan, syllabus.

The Natural Science Museum from Târgu-Mureș owns priceless collections of fossils, minerals, rocks, plants, fungus, invertebrates (snails, shells, insects), birds, eggs, mammals, haunting trophies, containing approximately 73 000 pieces.

Starting with this rich patrimony, some general conclusions, a few minimal requirements from the collaboration between the museum and the school and also its efficiency, in the last few years the museum has done its best in order to create a strong approach to the school public.

The beginnings were modest and sporadic. It all started with a few thematic visits to the museum exhibitions, some PowerPoint presentations, based on natural science themes, the commemoration of the important international nature days and a few trips in the nature, all of these factors leading to a flourishing collaboration between the museum and other educational institutions.

The restructuring of the educational offer has developed into special pedagogical programmes, which are meant to increase the museum’s patrimony according to the teaching structure.

One of the reasons why this whole idea with a new upgraded educational programme came up is because after December 1989, the public schools had lost their interest in the museum, due to the fact that the educational possibilities were not used properly in order to benefit the students and also the teachers. There were several hesitations from the teachers (the restructuring of the offer to be done in such a way so that it does not bring any harm to the master plan, textbooks and syllabus) and also from the museographers (the tendency to treat this sort of collaboration as a collateral activity in the matter of their scientific preoccupations).

Therefore, a second reason which generated this innovation was the fact that the public schools remained the most numerous and steadfast addressee and consumer of the museum's message.

There were taken into consideration a few minimal demands inquired from the collaboration between the school and the museum. These would be the followings:

➔ *from the museum:*

- the knowledge of the syllabus, the general and specific skills, the scientific contents solicited for the entire period of the high school education;
- the organization of some didactic activities in order to increase the museum's patrimony and the school needs to consolidate a proper sort of education.

➔ *from the school:*

- the welcoming of innovating didactic activities accomplished within a new educational frame provided by the museum's interactive halls and the diversity of activities hosted in there;
- the knowledge of the planning and the conduction of the activities unfolded in this particular environment.

➔ *from the both sides implied in the process:*

- the agreement between the museographer and the teacher for a proper collaboration in terms of the accomplishment of the educational objectives established by each side involved in the process.
- the agreement established between the museum and the school in terms of the way this whole concrete collaboration has been done and the result's grading made by the both sides involved in the process.

There are several arguments which favor the efficiency of the collaboration between the school and the museum:

- the main objectives of the school and the museum happen to be the same; they are in connection with the active and conscious participation of a student on their own formation, the regularity and continuity in studying and also with the accessibility of the subject;
- the museum has got the possibility to demonstrate problematic issues in terms of biology themes;
- the common educational activities, the integration of the museum-school activities, which increase both prestige, improves and maximize the didactic methods;
- the museum has got the possibility to be permanently present in the student's life, including the holydays.

The thorough covering of the syllabus has led to an interesting conclusion. The problem of the collaboration between the school and the museum has been treated more intensely in the pedagogical works released by the museum, than in the case of teaching biology. Biology didactic works, the ones which are the most accessible to the teachers, remained focused on the old habits, generally illiberal organized visit and the lesson developed at the museum as being the most effective way for the activities hosted in this environment.

It is necessary that these activities, which are taking place at the museum, to focus rather on discovery, demonstration and experiment, related in a 3D environment, than on sending and illustrating data in the old fashioned way.

There were analysed some possibilities in order to diversify the educational offer of the museum, such as:

1. the organized visit at the school's initiative;
2. the organization of the visit will be fully prepared by both institutions (teacher-school-master-museographer), usually according to the syllabus;
3. the regular classes from school to be supplemented with didactic material from the museum;

4. classes taking place at the museum under the leading of the teacher/schoolmaster;
5. supplementary or initiative classes organized at the museum on natural science themes, during the school year and also on holidays;
6. museum halls used as creative workshops, workshops or toy libraries with specific inquiring;
7. exhibition activities organized, in collaboration, at school or at the museum's head quarter, in special fitted places (interactivity halls, multimedia halls);
8. the participation at the museum's activities (morning schedules, concerts, shows, competitions, films etc.);
9. the promotion of the museum's patrimonial values through: specialty books, publicity sets, videos, CDs, games, special lines after objects found in the museum's heritage etc.;
10. activities such as "The students are making the tour of the museum to their parents and teachers".

Therefore, the students' availability for changes and innovation has got in the museum the adequate environment, so that it can involve properly than in the traditional classrooms.

The optimization of the school-museum relationship can imply, as purposes, the following aspects:

1. due to the fact than the legal settlements, which are meant to establish that the didactic activities developed at the museum belong to the syllabus, and are missing, it is necessary that the upgraded relationship between the school and the museum, based on partnerships, to contain the followings:

- a precise schedule (theme, duration, steps) specialized on each group of age and educational levels, and even for specializations within high school teaching;
- the parts' tasks, obligations and responsibilities;
- concrete ways of collaboration;
- a scientific based offer.

2. in order to fulfill these specific actions, the museum should have a certain pedagogical space (interactive activities hall, toy library, multimedia hall), with the necessary equipment;

3. the public relations department must have a pedagogical section and a specialized person as a leader, which aims an efficient-raising activity of both, teachers and students, school environment in general;

4. the accomplishment of increasing and enhancing the educative staff's potential in such way, so that it can be done through and in the museum;

5. the diversity of the educational offer released by the museum on age categories through creation workshops, conservation and restoration workshops, workshop-exhibitions, videos, friends of the museum's club, museum's volunteers club etc.;

6. the educational activities to be fulfilled in connection with the syllabus requests.

To sum up, the museum is integrated into the educational process as a factor meant to vary the skills and knowledge gained during the school years. These can be viewed at the museum in the form of a concrete and direct representation, offering the student the possibility to perform selections and associations, to accomplish connections and concrete experiments, as a part of an open and active type of learning.

Through their common actions, it is necessary that the museum and also the school to do their best in order to facilitate the scientific knowledge using modern and interactive pedagogical methods. The museum's intention is not to replace the school's work, but to enhance it, by allowing students to take part at the pedagogical activities hosted in there.

The collaboration between the museographer and the teacher may be taken into consideration as a modern and effective method in the diversification of the museum's pedagogical offer, in such a way so that it optimizes the whole educational process.

Starting from the temporary exhibition "Bats between science and legend", itinerated by the Danube Delta Ecotourism Museum Center from Tulcea to the Natural Science Museum from Târgu-Mureș, from the diorama, representing a cave, as part of the fundamental exhibition of the Natural Science Museum from Târgu-Mureș and also from the event "European Bats Night", celebrated each year in August-September, in European countries, to attract the public attention on jeopardizing the bats population, there was carried out a performed programme on museum pedagogy called "The European Bats' Night".

The main purpose of this project was the turning into account of the "Bats between science and legend" exhibition as well as the museum patrimony through the "cave" found in the fundamental exhibition.

The objectives of this project were the followings:

- to accustom students to the problems of the bats life and also to encourage them with a future "proximity" to these unique animals;
- to attract the public attention on the jeopardizing the bats population and also upon the environment protection in general;
- to develop the intellectual skills;
- to accustom the children with working with auxiliary things in order to enrich their knowledge, such as: texts, flyers, labels, badges etc. (Fig. 1);
- to develop the students' spirit of observation;
- to develop the students' creative imagination;
- to initiate the genuine pleasure in visiting the museum.

The project has started with a cooperation protocol at the beginning of the school year 2008–2009, between the museum and the two other participant schools: "Alexandru Papiu Ilarian" National College and "Europa" Elementary School. In this project were involved six classes, fifth and eighth graders from "Alexandru Papiu Ilarian" National College and the fourth graders from "Europa" Elementary School and also a biology teacher, an art teacher and two schoolmasters.

The activities have been developed according to a precise schedule (Fig. 2 a, b).

The documentation phase of the project took place between August and September 2009. It has consisted in constant visits to the public and students' personal library in search of information about the bats biology and also a bit of field research in the attempt to identify the bats population from Târgu-Mureș.

The creation phase consisted in:

- the presentation part called "In expectation for the bats", where students had the chance to present their own projects (Fig. 3). The activity took place at the museum's head quarter in September 2009, at 7 p. m., meaning at night, when the bats begin their activity. The event was spiced up due to the talent of some students who had come up with flyers which contained information about the necessity of protecting the bats population;
- the organization of two creation workshops "My beloved bat" and "Wings in the darkness".

At the "My beloved bat" workshop, students tried to create a cave, after the original one, found in the fundamental exhibition, bats from the museum's specimens and mammal's collection and also after specialized books, using all sorts of materials (cartoon, seeds, fruits, textiles). For some bats there were created labels after the ones found in the museum's collection, including the Latin name and the traditional name of the bat and even a possible collecting place.

At the "Wings in the darkness" workshop, students made paintings representing bats, under the leading of an art teacher and schoolmaster, using as a model pictures, the aspects found in the museum's collection.

The evaluation phase finalized and valorised the other two through:

- the organization of an exhibition of the students' creative works (bats, caves, paintings);

- the organization of a conference where two major themes were treated: "Bat caves from Romania" (assisted by dr. Marius Cigher from "Dimitrie Cantemir" University from Târgu-Mureș, and "Vampires" (assisted by Daniela Botoș, museographer/teacher); (Fig. 4)
- "The bats ball" at which all the participants were wearing thematic costumes, masks and badges with the name of the event "European Bats Night", finalized with the awarding of the best bat costume (Fig. 5).

Conclusions

In the eight following weeks, after the project's launching, about one hundred students from "Alexandru Papiu Ilarian" National College and "Europa" Elementary School took part in the activities hosted at the museum.

"The bats ball" was the most successful around the participants.

There has been stated a great collaboration and involvement from both, the school and the museum.

The museum benefits are important due to the fact that the institution has managed to fulfill properly one of its basic tasks, the educational one.

REFERENCES

1. Ardelean, A., Marcu, V., Marinescu, M., Botea, M., 2003, *Introducere în didactica Biologiei*, "Vasile Goldiș" University Press.
2. Ciurchea, M., Ciolac-Russu, A., Iordache, I., 1983, *Metodica predării științelor biologice*, Ed. Didactică și Pedagogică, București.
3. Cojocariu, V., Barabaș, N., Mitocaru, V., 1998, *Pedagogia muzeală*, Ministerul Culturii, Centrul de Pregătire și Formare a Personalului din Instituțiile de Cultură, București.
4. Cristea, S., 1998, *Dicționar de termeni pedagogici*, Ed. Didactică și Pedagogică, București.
5. Florescu, R., 1998, *Bazele muzeologiei*, Ministerul Culturii, Centrul de Pregătire și Formare a Personalului din Instituțiile de Cultură, București.
6. Iordache, I., Leu, U., M., 2001, *Metodica predării-învățării biologiei*, Ed. Corson, Iași.
7. Oberlander-Târnoveanu, I., 1998, Publicul înainte de toate. Regândirea muzeului în lumea contemporană, *Revista Muzeelor*, **11**: 15–30.
8. Oprea, I., 2000, *Transmuseographia*, Ed. Oscar Print, București.
9. Pante, Gh., 2003, *Bazele biologice ale educației*, Casa Cărții de Știință, Cluj-Napoca.
10. Pungă, O., Simion, V., 1998, *Pedagogie muzeală*, Ministerul Culturii și Cultelor, Centrul de Pregătire și Formare a Personalului din Instituțiile de Cultură, București.

PROGRAMUL DE PEDAGOGIE MUZEALĂ „NOAPTEA EUROPEANĂ A LILIECILOR” (Rezumat)

Muzeul de Științele Naturii din Târgu-Mureș a realizat, în perioada august-octombrie 2009, un program de pedagogie muzeală, intitulat *Noaptea Europeană a Liliecilor*, pornind de la expoziția temporară "Liliecii – între știință și legendă", itinerată de la Centrul Muzeal Ecoturist "Delta Dunării" din Tulcea, de la diorama reprezentând o peșteră, aflată în expoziția de bază a muzeului și de la evenimentul "Noaptea Europeană a Liliecilor", sărbătorit în fiecare an, în august-septembrie, în țările europene, pentru a atrage atenția publicului larg asupra periclitării populațiilor de lilieci. Acesta a cuprins trei faze: faza de documentare (care a constat în documentare la biblioteci și deplasări în teren), faza de creație (care a constat în organizarea a două ateliere de creație) și faza de evaluare (care a constat în organizarea unei expoziții, a unui bal al liliecilor și a unei conferințe). În proiect s-au implicat 6 clase: elevii claselor V–VIII de la Colegiul Național "Alexandru Papiu Ilarian" din Târgu-Mureș și două clase de a IV-a de la Gimnaziul Europa din Târgu-Mureș. Cel mai mare succes la public a avut balul „liliecilor”.



Fig. 1: Badge



Fig. 2 a, b: The schedule



Fig. 3: “My beloved bat”



Fig. 4: The conference “Vampires”



Fig. 5: The bats ball

SHORT COMMUNICATIONS

DECORATIVE STONE – IN THE MUSEUM AND OUTDOORS ACTIVITIES, EDUCATIONAL ACTIVITIES AT THE TÂRGU-MUREȘ NATURAL SCIENCE MUSEUM

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Abstract: The following paper is presenting a synthesized description of a sample activity plan from the project “Geology for kids”. The plan includes objectives, activity structure and procedures.

The initiative came as intent to integrate the Museum in the community and bring awareness to kids of their impact in a community and the environment. The children are encouraged to participate in museum activities, integrate those activities in everyday life and apply the knowledge received in their future interaction with the community.

The interactive manner in which the activity plan is designed is meant to entice the children curiosity and encourage future collaboration with the Natural Science Museum, activities that will provide with an outlet for skill building and civic competency acquirement.

Keywords: educational activities, decorative stone.

Introduction

The project is a segment of a larger theme “Geology for kids” and it is meant to incite and satisfy the child basic curiosity. They will uncover the secrets of Earth in the context of multiple educational activities. First they will get to know it as a planet, and then they will discover his internal structure. The following step will introduce them to the beginning of life on Earth, its evolution, soils, minerals, rocks, reservoirs, ground forms, and their dynamics, erosion and pollution. Everything will be explained, experimented and verified in the museum, on field trips or in the lab.

General objectives:

- valuing of Museum’s patrimony;
- developing in children an interest for the environment, and appreciation for it no matter where that environment is found (in the museum, outdoors, in the city).

Specific objectives:

- promoting the Natural Science Museum in schools and local communities;
- understanding and application in everyday life of knowledge and skills obtained through educational activities;
- cultivation of team work and civic conscience for children.

Materials:

- minerals and rocks exhibited in the museum, or pertaining to the Museum's collection;
- samples, polished plaques and objects from the Museum's decorative stone collection;
- rock classifiers, encyclopedias, and specialty books.

Procedures:

- explanation of activities;
- engaging the children in free dialogue;
- establishing hypothesis and verifying them with the children;
- directed investigation;
- team work and job delegation;
- discussions.

Activity description

Preschool children and children grades I-IV will be initiated in the knowledge of decorative stones in 3 stages.

- They will get to know magmatic rocks, sedimentary rocks, and metamorphic rocks from the Museum's systematic basic exhibit. They will learn about the history of stone utilization from the beginnings until present times. The notion of rock and the classification criterion of rocks will be discussed. They will be introduced to the main 3 groups of rocks. The children will learn about the concept of decorative stones and they will see and touch samples of polished and unpolished stones, from the museum collection.
- The activities will be structured differently based on the children developmental age and capacity of understanding. At preschool age children the activities will focus more on the interactive aspect, the children getting to touch and handle the materials. The scientific terms will be explained more generalized. The main part of the activity will be having direct contact with each rock and discussing about it, by observing, size, structure, color and other physical characteristics. The children will experiment sensorial (tactile and visual) each polished and non polisher stone.
- In the second stage the children asked to identify in the city some of the rocks presented during the activities and take photographs. This stage can be done individually, with the help of a teacher, parent, or as a secondary activity with museum staff. After the materials have been identified, the group will meet at the Natural Science Museum where the findings will be discussed. A PowerPoint presentation with the photography taken by children will be presented, or an exhibit will present the children's photography (exhibit that can be afterwards transferred at the school or child care that the group belongs to). On a relative small areal in the down town part of the city many of the decorative stones presented in the activity can be encountered: travertine, marble, polychrome limestone, granite, andesite, aragonite (in the Theatre Plaza, Roses Plaza, Culture Palace etc.).
- Final stage will be a field trip to the mountains. The trip will take place in the Toplița-Deda pass, at Lunca-Bradului. We will identify volcanic rocks, and on Valea Ilvei we will look for opalized wood, jasper and other decorative stones partially polished by water.

Learning Objectives

The proposed activity is part of the educational project "Geology for kids".

The project is focused in creating and maintaining skills that will allow children to:

- combine team work with practical field work in the museum and in every day life. This will help strengthening their knowledge pertaining environmental aspects and engage kids in actively participating in future museum activities, as well as applications of the acquired knowledge outside of the museum;
- integrating the Natural Science Museum in the community;
- diversifying the Museum's educational offers, improving the quality of knowledge sharing and establishing cultural competition in the field of science and education;
- allowing the children to participate individually in activities and bring input, therefore contributing to their overall intellectual and rhetorical development;
- introducing children to working in a community (ex volunteer work).

REFERENCES

1. Vergo, Peter, 1989, *The new museology*, Reaktion Books Ltd, London.
2. Robert, Lumley, 1988, *The museum time machine*, Routledge, New York.

PIATRA DECORATIVĂ – ÎN MUZEU ȘI ÎN AFARA LUI ACTIVITATE EDUCATIVĂ LA MUZEUL DE ȘTIINȚELE NATURII DIN TÂRGU-MUREȘ (Rezumat)

Proiectul face parte dintr-o temă mai largă, „*Geologia pe înțelesul copiilor*” și se bazează pe stărnirea și satisfacerea curiozității specifice a copiilor. Ei vor desluși tainele Pământului ca planetă, structura sa internă, a vieții trecute de pe glob, a solurilor, mineralelor, rocilor, zăcămintelor, formelor de relief, ale dinamicii lor, ale eroziunii și poluării. Totul va fi explicat, experimentat, verificat, în muzeu, pe teren sau în laborator.

Prin lansarea preoiectului educațional urmăresc să obțin următoarele rezultate:

- îmbinarea de activități practice în teren, experimentele, munca în echipă, vor ajuta la fixarea mai temeinică a cunoștințelor cu privire la tema propusă, la trezirea interesului față de muzeu și mediul înconjurător;
- redimensionarea muzeului ca o comunitate autentică, racordată la viața publică;
- deschiderea activității educative extracurriculare spre implicare și responsabilizare în viața comunității;
- diversificarea ofertei muzeale, creșterea calității actului educațional și a concurenței pe piața educației;
- valorificarea potențialului creativ al copiilor prin asumarea de roluri;
- valorificarea voluntariatului și dezvoltarea conștiinței și utilității sociale a copiilor;
- promovarea responsabilității în vederea creșterii calității vieții și a mediului înconjurător în comunitate.

THE PREOCCUPATION OF THE “MÁLNÁSSY LÁSZLÓ” MYCOLOGICAL SOCIETY FROM TÂRGU-MUREŞ REGARDING THE POPULARIZATION OF MACROMYCETES

András MÁLNÁSI

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Abstract: The “Málnássy László” Mycological Society was founded in Târgu-Mureş in 2005. Its founders were initially members of the other two mycological societies (in Iaşi and Sfântu Gheorghe). The society’s main preoccupations are: scientific research in the field of mushrooms, education of the population regarding mushrooms, use of mushrooms in alimentation, due to their healthy nutritional value, development and practice of activities concerning the prevention of mushroom intoxications.

Keywords: macromycetes, education of the population.

The branch of the natural sciences that studies mushrooms is called mycology. Those specialists who study these organisms are the mycologists. They can be professionals with or without doctorate or amateurs. These specialists work in education, hospitals or other sanitary institutions, in food industry or in pharmaceutical industry. In these areas further studies about mushrooms, especially those microscopic ones, called micromycetes, are compulsory. On the other hand, amateurs are passionate about bigger mushrooms, called macromycetes, which grow in fields, forests, parks or other places. Most of these mushrooms are edible; however, there are some that are toxic or deadly poisonous.

In Romania there are three mycological associations registered, one in Iaşi, one in Târgu-Mureş and one in Sfântu Gheorghe, formed of professionals and amateurs with the following preoccupations: thoroughgoing study of mushrooms, to inform people about the benefits of eating mushrooms and preventing people from getting intoxicated with mushrooms.

In Târgu-Mureş mycological preoccupations started in the 18th century, when the famous doctor K. Mátyus István in his monograph of 6 volumes, “*Ó és Új Diaetetica*” assigned a whole chapter to mushroom diet. He described several species of macromycetes, including first aid in case of poisonings. In 1972 was published the “Kis gombáskönyv” at Dacia Publisher, whose author was Málnássy László from Târgu-Mureş. The second edition of this book, enlarged and brought up-to-date, appeared in 2003. As a sign of acknowledgement our Mycological Society has been named after him.

In 1991 was formed a Mycological Society within the Institute of Medicine and Pharmacy in Târgu-Mureş which functioned only a short time. Some of its members transferred to the association in Iaşi, directed by the late prof. univ. Mihai Toma, author of several volumes

dedicated to macromycetes; and to the Mycological Society with center in Sf. Gheorghe (LKG), whose president was and still is prof. univ. Zsigmond Győző.

The society's main preoccupations are: scientific research in the field of mushrooms, education of the population regarding mushrooms, use of mushrooms in alimentation, due to their healthy nutritional value, development and practice of activities concerning the prevention of mushroom intoxications.

In order to accomplish our objectives, we organize a series of exhibitions with fresh edible and poisonous mushrooms, conferences, camps, trips into the nature. We collaborate with other similar associations in Romania and abroad; with state institutions and other civil organizations. Every month we organize a trip where we invite people from outside our society. The trip ends with an exhibition of freshly picked mushrooms, specifying their edibility or toxicity.

Eighteen of our members attended courses and trainings in this topic until today. Ten of them also obtained a qualification in mushroom controlling. All the examiners were mushroom specialists from the Universities of Bucharest, Iași, Budapest and Kaposvár (Fig. 1).

We participate on a yearly basis in camps, symposiums, national and international mycological conferences. We participated at the symposiums in Sibiu, Sinaia, Oituz, Comandău, Câmpul Cetății, Ghimeș Făget, Sărățel, Rimetea, Răstolița, Borsec, Madarașul de Câmpie. At the symposium in Arcuș in 2010 we gathered and identified a number of 275 species of mushrooms.

We established a cooperation with the Zoo in Târgu-Mureș. We represent on a panel the specific mushrooms of each season. We also illustrate on the panel the *Amanita phalloides* (death cap) the most poisonous mushroom. We also organize exhibitions with freshly picked mushrooms from the area of Cornești.

We work on Mycological maps from different tourist-areas of Mureș County.

Each year we participate in the Fair of non-governmental organisations in Târgu-Mureș with exhibits, flyers and information about mushroom for those interested.

In 2010 we organized an exhibition without precedent in Romania with artistic pictures of mushrooms taken on their growing spots. The best pictures were awarded by our sponsors with diplomas, baskets full of mushrooms and other objects. This material was exhibited with the occasion of the International Mycological Camp in Arcuș, as well. A part of the photographs were temporarily exhibited in the Natural Sciences Museum as well as in the Zoo of the city within the scope of a didactic program. At present, a part of the pictures are exhibited in a gallery in Oradea.

On the request of the Corvin Publishing House in Deva I read the manuscript of the "Gombak" ("Mushrooms") book for the publisher. It appeared in 2010 and it contains the description of more than 200 species of mushrooms. I also provided the majority of the photographs for the book. In less than two weeks almost all of the copies were sold. We plan the publishing of a second edition, enlarged, in 2011 and also the publishing of a calendar that will come out at the beginning of December this year.

We participate in the pedagogical program of the museum "Cu pași mărunți prin muzeu" initiated by the Târgu-Mureș Natural Sciences Museum.

We collaborate to edit our review and annuary: "Moeszia. Erdélyi Gombász" (six numbers published from 2003).

The 30/2006 law, republished in 2008, containing rules of public health concerning mushroom use from the natural flora establishes rules about transport, gathering, processing and commercialization of mushrooms. More specifically, it sets out how the marketing of mushrooms from the spontaneous flora in retail markets; a total of 35 species of fungi that can be sold; fines for breaking the law; the obligations of the seller and inspector to check the merchandise, but

does not specify who and what qualifications can meet the position of inspector. Although the law has appeared four years ago, it is still forbidden to trade in markets mushrooms from the spontaneous flora. Our organization, together with the other fungal associations in the country have submitted several proposals, complaints, petitions to the government on this issue, but they often got lost between the political struggles, or have been returned or saying that solving this problem does not get care at their Ministries. Meanwhile more and more cases of mushroom poisoning occur, mushroom poisoning caused by ignorance and lack of knowledge. In some cities (Oradea, Sfântu Gheorghe), authorities found a compromise: they recognized specialist qualifications similar to those of members of our society, and on certain days, allowed the sale of mushrooms from the spontaneous flora, provided that they be checked by the inspector in the field. In Târgu-Mureş, however, the Market Department are not so sympathetic with it and therefore we can not exploit inspector specialized diplomas for mushrooms. However, because of advertising flyers, in which appear details of inspectors, they are requested to examine and identify mushrooms collected by hikers, or purchased of the occasional merchants.

We consider our preoccupations in informing the population about the possibility of mushroom intoxications very benefic. Our work has not been in vain. In Mureş county has not been registered any deadly mushroom intoxications lately.

The number of those interested in mycology is still in growth. More and more people participate on our mushroom gathering trips; even children and young families. They will share with others the knowledges about the relationship between humans and mushrooms.

Nr.: 6 din 28 octombrie 2006

DIPLOMĂ

pentru Dl. Málnási András
născut/ă la 20.10.41 în ziua 13 luna III, anul 1943
(prenumele tatălui: László) care a terminat cursul de
specialitate organizat de către Societatea de Micologie „Kálmán
László” în colaborare cu Societatea de Micologie din Ungaria și
Societatea de Micologie din România.
A susținut examen în fața comisiei formate din specialiști în domeniu
(profesori) de la Universitatea din București, respectiv Iași și
Kaposvár, cu rezultatul următor:
proba teoretică: 9,66
proba practică: 9,25

Această diplomă / autorizație a fost obținută pentru ocupația,
specializarea de:
controlor specializat pentru ciuperci

Sf. Gheorghe, 28 octombrie 2006

T. László S. Gheorghe
președintele comisiei de examinare conducătorul unității organizatoare

SEMPER PRELUAT DIPLOMA:

Sorszám: 6 / 2006. október 28.

BIZONYÍTVÁNY

Málnási András részére,
aki 20.10.41 1943 év, III hó, 13 napján
született (anyja neve: Walter Erzsébet)
szakmai tanulmányait a Magyar és a Román Mikológiai Társasággal
együttműködő László Kálmán Gombaszegyesület szervezésében
végezte.
A Bukaresti Tudományegyetem, a Kaposvári Egyetem, valamint a
Iasi-i Tudományegyetem, ill. a felsorolt egyesületek szakembereiből
(oktatóiból) álló vizsgabizottság előtt vizsgát tett
szakmai elméletből: 9,66
szakmai gyakorlatból: 9,25
eredménnyel.
Ez a bizonyítvány kiállítatott annak igazolására, hogy tulajdonosa:
gombaszakellenőr.
Jelen okirat a fenti megnevezésű szakképzést igazolja.

Sepsiszentgyörgy, 2006. október 28.

T. László S. Gheorghe
a szakmai vizsgabizottság elnöke a szakképzést szervező intézmény vezetője

SEMPER PRELUAT DIPLOMA:

Fig. 1: Qualification Diploma in mushroom controlling

**PREOCUPĂRILE SOCIETĂȚII DE MICOLOGIE “MÁLNÁSSY LÁSZLÓ”
DIN TÂRGU-MUREȘ PRIVIND POPULARIZAREA CUNOȘTINȚELOR
DESPRE MACROMICETE
(Rezumat)**

Societatea de micologie „Málnássy László” s-a înființat la Târgu-Mureș, în anul 2005. Fondatorii ei au fost inițial, membrii celorlalte două asociații micologice, din Iași și din Sfântu-Gheorghe.

În Târgu-Mureș, preocupările micologice au început, de fapt, în secolul al XVIII-lea, când renumitul medic K. Mátyus István, în monografia în șase volume „*Ő és Új Diaetetica*”, aflată și în patrimoniul Bibliotecii Teleki, a consacrat un capitol întreg alimentației cu ciuperci, descriind mai multe specii de macromicete, inclusiv măsurile de prim-ajutor în caz de intoxicații.

Principalele preocupări ale societății noastre sunt: cercetarea științifică în domeniul micologiei, educarea populației prin propagarea cunoștințelor în domeniul micologiei, folosirea ciupercilor în alimentație, datorită valorii lor nutritive deosebite, modalitățile de prevenire ale intoxicațiilor cu ciuperci, dezvoltarea și practicarea unor activități care să vizeze prevenirea intoxicațiilor cu ciuperci.

În scopul realizării programului propus, organizăm o serie de expuneri, conferințe, întâlniri, tabere, excursii, expoziții cu ciuperci proaspete, comestibile, toxice și otrăvitoare spontane. Colaborăm cu alte asociații similare din țară și din străinătate, cu instituții ale statului și cu alte organizații civile. În fiecare lună, organizăm câte o excursie, cu invitați și din afara societății noastre, finalizată printr-o expoziție cu ciuperci proaspăt culese, precizându-se gradul lor de comestibilitate sau de toxicitate.

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